

Academic Year/course: 2022/23

## 28420 - Pharmacology and Drug Therapy

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 28420 - Pharmacology and Drug Therapy

**Faculty / School:** 105 - Facultad de Veterinaria

**Degree:** 451 - Degree in Veterinary Science

**ECTS:** 9.0

**Year:** 3

**Semester:** Annual

**Subject Type:** Compulsory

**Module:**

## 1. General information

### 1.1. Aims of the course

The fundamental goal will be that students acquire the appropriate basic training for the use of the different drugs, which in turn will serve for the understanding and analysis of other clinical disciplines of the veterinary degree.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations

2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>), in such a way that the acquisition of the results of learning of t

training and competence to contribute to some extent to its achievement:

Objective 3: Health and well-being.

Objective 4: Quality education.

Objective 5: Gender equality.

### 1.2. Context and importance of this course in the degree

The contents of pharmacology, pharmacy and pharmacotherapy in the context of the veterinary degree will have importance in a large part of the professional actions of the veterinarian that involve the use of drugs.

The knowledge acquired in previous courses from disciplines such as basic Sciences for Veterinary Medicine, Biology and Biochemistry, Parasitology, Animal Physiology and Microbiology will facilitate the understanding of its contents.

### 1.3. Recommendations to take this course

It is necessary to have knowledge of subjects from previous grade courses such as:

1. Basic Veterinary Sciences
2. Animal Physiology
3. Microbiology
4. Parasitology
5. Biology and biochemistry

## 2. Learning goals

### 2.1. Competences

On successful completion of this course, students will be able to:

#### 1: Specific:

- Know the general pharmacological bases.
- Know the pharmacological aspects and to study the different types of drugs. To know the basics of

pharmacotherapy.

## 2: Transversal

- 1.-Have the capacity for analysis and synthesis 2.-To take decisions
- 3.-Teamwork
- 4.-Solve problems
- 5.-communicate with people who are not experts in the field
- 6.-Be critical and self-critical

## 2.2. Learning goals

If students complete the course, they should be able to

1. Describe and interpret the meaning of the main pharmacokinetic parameters of the one-compartment model.
2. Relate the evolution of the drugs in the organism with its consequences in the effectiveness of a treatment.
3. Classify the drugs according to their relationship with the different receptors, and explain the interactions that can occur between them and their consequences.
4. Recognize the adverse reactions that drugs can produce, assess them and, if necessary, propose measures to reduce them.
5. Differentiate the pharmaceutical forms of presentation of a medicine and choose the most appropriate according to the desired effects.
6. Know the pharmacological and therapeutic bases of the drugs with action on microorganisms; on the central and peripheral nervous system; on the cardiovascular, respiratory, digestive and hormonal systems and on the dermal processes.
7. Apply the general basis for the establishment of an adequate pharmacological treatment.
8. Calculate the amount of a drug that needs to be given to a patient to achieve the goal of a drug treatment.
9. Select the best treatment for the resolution of a health problem in a patient.
10. Know the regulations that affect the use of drugs in animals, and to adapt their actions to them.

## 2.3. Importance of learning goals

These learning results allow the student, together with the rest of the competences acquired in Chemistry, Physiology, Parasitology and Microbiology, to be trained to deal with the specific aspects in medical and surgical treatments that will have subsequent application in the veterinary training profile and in their subsequent professional profile.

## 3. Assessment (1st and 2nd call)

### 3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

#### Evaluation activities

The student must demonstrate that has achieved the intended learning outcomes through the following assessment activities

**1:** Evaluation of the knowledge acquired with respect to theoretical teaching, which includes that acquired in theoretical classes.

Two written tests will be carried out (first partial and second partial), the first corresponds to the section of General Pharmacology and Pharmacology of Infectious and Parasitic processes, and the second to the section of Nervous System and Organs and Systems.

Both tests will consist of 50 multiple-choice questions with four alternatives answers with only one right answer, graded with 1 the right answers, 0.33 negative points for wrong answer and 0 points per unanswered question. Passing these tests will accredit the achievement of learning outcomes 1 to 10 and globally account for 70% of the final grade.

**2:** Assessment of laboratory sessions.

Continuous assessment:

During the week following the laboratory practices, the students will be able to carry out an activity of evaluation of the knowledge acquired in them through Moodle-ADD. The activity will be individual, and will consist of solving dose calculation problems, issuing recipes and short questions in relation to the tasks carried out in the laboratory practices. Completion of this activity will allow the student to achieve a total of a maximum of 10 points (10% of the final grade)

Students who do not take the continuous assessment will be able to take a final assessment written test of the knowledge acquired in all practical sessions. This exam will be done on the date established for the official calls of the subject. and will consist of solving problems and test questions test questions of four alternatives with a single correct option, rated as 1 point for a question answered correctly, 0.33 negative points for a question answered incorrectly and 0 points for a question not answered. This exam will allow the student to achieve a maximum of 10 points in total (10% of the final grade).

**3:** The assessment of the special therapeutic practices will be carried out through the report presented by each work team and the continuous assessment of the tutor assigned to each group. The score of these practices is 20 points (20% of the

final grade) and accredits the achievement of learning outcomes 1, 2, 3, 5 and 8, and of transversal competence 4. Passing these tests accredits the achievement of learning results 1, 2, 3, 5 and 8, and of transversal competence 4.

**4:** The first and second partial assessment tests will take place on the dates indicated in the examination schedule drawn up by the centre.

#### **5: Global test**

Students who do not attend either classes or practices (laboratory and seminars) may take a multiple-choice questions final exam of the whole subject (theory, practices and the rest of the training activities). The exam will be written and will consist of 130 multiple-choice questions with only one right answer. The grade will be 1 point for right answer, 0.33 negative points for wrong answer and 0 points for not answered question.

#### **Valuation criteria and requirement levels**

##### **1: Continuous evaluation:**

The student's final grade will be obtained from the weighted sum of three parts,

##### **THEORY**

It corresponds to 70% of the student's final grade.

You will score on two separate tests, each consisting of 50 questions, with a value of 1 point per question. The first will correspond to the sections of General Pharmacology and Chemotherapy (to be carried out in February) and the second to the section of Organs and Systems (to be carried out in June).

These exams are considered computable when a minimum score of 25 points is obtained in each one of them, otherwise they do not grant any qualification, and must be repeated until this score is reached in subsequent sessions.

A student with 100 points out of 100 would get 7 points for his final grade. The minimum required (50 points on 100) would get 3.5 points for his final grade.

##### **THERAPEUTIC PRACTICES**

It corresponds to 20% of the student's final grade.

They will take place during the second quarter and will be graded globally on 20 points. The tutor of each group will be in charge of assessing the report presented at the end of the internship according to the criteria set out in the Teaching Guide. A minimum of 10 points will be required to pass this section.

##### **INTERNSHIPS AND SEMINARS**

It corresponds to 10% of the student's final grade.

It will consist on the realization of a qualified examination on 10 points to be carried out online in the MOODLE-ADD application, or on the dates established for the official calls for the course. Following these criteria, a student's final grade will be obtained by applying the following equation:

$$\text{FINAL NOTE} = (0.7 \times \text{THEORY}) + (0.2 \times \text{PRACT. TERAP.}) + (0.1 \times \text{LAB.SESSION})$$

The grades obtained will be valid throughout the academic year.

##### **2: Overall evaluation:**

The overall examination will be graded on 130 points, and will be passed with a minimum score of 87 points.

##### **Marking system:**

According to the national regulation Law 1025/2003, 5th of September which lays down the European system of credits and marking system for the university degree.

0-4,9: FAIL.

5,0-6,9: PASS

7,0-8,9: GOOD (NT).

9,0-10: EXCELLENT (SB).

As the article 158 of the Statutes of the University of Zaragoza lays down, provisional grades will be displayed at least for 7 days and students will be able to review them on the date, time and place provided for that purpose.

## **4. Methodology, learning tasks, syllabus and resources**

### **4.1. Methodological overview**

The course is structured in two general topics: (a) Pharmacy and Pharmacology and (b) Pharmacotherapy, developed according to the following criteria:

a. 90 classroom hours:

- 60 hours of lectures.
- 16 hours of laboratory sessions.
- 5 hours of seminars.
- 7 hours of special therapeutic practices.
- 2 hours of supervised work.

b. 135 hours of autonomous work:

Lectures are held in the classroom with students divided in two groups.

Four seminars will be organized (one hour for session) and will be based on clinical cases.

The laboratory work will consist of four sessions: (a) routes of administration and dose calculation, (b) pharmacokinetic and dosage forms, (c) pharmacodynamics I and (d) Pharmacodynamics II. They will be conducted in the laboratory of Pharmacology, in groups programmed by the center, within the first semester of the academic year. Initially, an explanation of the session will be done. Subsequently, students will practice under the supervision of teachers. Students will be provided with noteworks and specific materials for the practice. Laboratory dressing and the use of personal protective measures are required by the University.

Special therapeutic practices will be carried out with the approval of the Ethical Committee for Animal Welfare. They will be held throughout the second quarter and will include tutorials in groups of 6 students and the final submission of a written report. The appropriate clinical clothing (sanitary dress) is required.

## 4.2. Learning tasks

Lectures, 60 hours

Laboratory practical classes, 16 hours

Seminars, 5 hours

Special therapeutic practices, 7 hours.

Supervised work, 2 hours.

## 4.3. Syllabus

The contents of each of these thematic blocks are presented in the program is detailed below:

Lecture topics:

1. - Introduction to Pharmacology. The concept of Pharmacology, basic principles and its relation with other disciplines.
2. - Drug transport and passage across membranes. Transport through channels, active transport, facilitated diffusion, absorption, aqueous diffusion of water-soluble drugs.
3. - Pharmacokinetics I. Absorption and distribution. Routes of administration. The concept of distribution. Binding to plasma and serum proteins. The blood-brain barrier and the placenta. Factors affecting drug distribution. Volume of distribution.
4. - Pharmacokinetics II. Drug metabolism. Pharmacological significance of metabolism. Site of biotransformation. Metabolic pathways: synthetic and non-synthetic. Factors affecting drug metabolism: physiological, pathological and pharmacological factors.
5. - Pharmacokinetics III. Drug excretion. General mechanisms of excretion and factors affecting drug excretion. Renal excretion. Liver-biliary excretion. Other excretion routes.
6. - Pharmacokinetics IV. Compartmental analysis model. Concepts and variables.
7. - Mechanism of drug action. Pharmacodynamics concepts. Drug receptors. Drug-receptor relationship. Concepts: Affinity and intrinsic activity. Dose-response curves. Agonist and Antagonist.
8. - Drug interactions. Concepts and modifications. Synergy and antagonism. Pharmacodynamic and pharmacokinetic interactions.
9. - Toxicity and drug side effects.

10- Gene therapy.

1. - Pharmacy. Type of drugs, dosage forms. Bioavailability and bioequivalence.

## PHARMACOLOGY AND CHEMOTHERAPY OF MICROBIAL DISEASES AND PARASITIC INFECTIONS.

1. - Introduction. General concepts. Classification and mechanism of action. Bacterial resistance to antimicrobial agents. Selection of an antimicrobial agent and therapy with combined antimicrobial agents. Toxicity and undesirable side effects. Chemotherapy: safe use of drugs in veterinary.

13- Antiseptics and disinfectants. General concepts. Classification. Pharmacological characteristic of the most commonly used antiseptics: alcohols, phenols, detergents, oxidizing agents, chlorhexidine.

NOTE: In each of the following lectures (14-21), will be included: Chemical structure, classification, mechanism of action, spectrum of activity, resistance, pharmacokinetics, toxicity and side effects, interactions and indications.

1. - Sulfonamides and diaminopyridines
2. - Antimicrobial drugs affecting bacterial cell wall. I. Beta-lactams antibiotics: penicillins, cephalosporins, monobactam, carbapenems, beta-lactamase inhibitors. II.
3. - Antimicrobial drugs that affect the bacterial protein synthesis. I. Aminoglycosides. II Tetracyclines. III. Phenicol.

IV. Macrolides, V. Lincosamides.

4. - Antimicrobial drugs that inhibit the nucleic acid synthesis. I. Quinolones. II. Nitrofurans. III. Nitroimidazoles., IV Rifamycins.
5. - Other antibacterial drugs. Polymyxins, Novobiocin.

19- Antifungal drugs. I. Topical use. II. Systemic use.

20- Anthelmintic drugs. I. Drugs against nematodes. II. Drugs against cestodes. III. Drugs against trematodes.

21- Anticoccidial drugs

### **PHARMACOLOGY OF THE NERVOUS SYSTEM**

22- Autonomic Nervous System. Neurotransmission. Drugs acting on the autonomic nervous system.

23- Adrenergic Pharmacology: sympathomimetic and sympatholytic drugs.

1. - Cholinergic Pharmacology.
2. - Autacoids: Histamine, antihistamines. Other autacoids.
3. - Central Nervous System stimulant drugs: analeptics.
4. - Non-narcotic analgesic drugs.

28- Narcotic analgesic drugs.

29- Local anesthetic drugs.

30- Neuroleptic drugs.

31- Inhaled anesthetic drugs.

1. - General anesthetic drugs: barbiturates, dissociative drugs, steroids drugs and other drugs with application in general anesthesia.

### **PHARMACOLOGY OF ORGANS AND SYSTEMS**

1. - Cardiac pharmacology.
2. - Vasodilator and vasoconstrictor drugs.

35- Hemostatic and anticoagulant drugs.

1. - Fluid Therapy.
2. - Diuretic drugs.
3. - Airway pharmacology: antitussive, mucolytic and bronchodilator drugs.
4. - Gastric pharmacology.

40- Digestive pharmacology: laxative and purgative drugs. Protectors. Adsorbents, Astringents. Drugs modulating intestinal activity.

### **HORMONE PHARMACOLOGY**

41 - Drugs acting on the reproductive system: steroid and protein hormones. Gonadotropins. Uterine muscle relaxant and oxytocic drugs.

42- Hormones affecting metabolism: Thyroid, Parathyroid, insulin and pancreatic hormones.

43- Corticosteroids therapy.

### **PRACTICAL PROGRAM**

#### **1. Laboratory**

Ten students per group (groups organized by the center):

1. Routes of administration and dose calculation.
2. Pharmacokinetics and dosage forms.
3. Pharmacodynamics. In vitro methods I.
4. Pharmacodynamics. In vitro methods II.

#### **1. Special therapeutic practices.**

Laboratory time, personalized tutoring and supervised work.

#### **1. Seminars**

1. Hormone Therapy.
2. Cardiovascular Therapy.

3. Fluid Therapy.
4. Pain, sedation and tranquilization.

#### **4.4. Course planning and calendar**

Calendar of meetings attendance and presentation of works: The dates and key points of the course are described in detail, along with the other subjects in the third course in the Degree of Veterinary Medicine at the website of the Faculty of Veterinary Medicine (<http://veterinaria.unizar.es/gradoveterinaria/>). This information will be updated at the beginning of the academic year.

#### **4.5. Bibliography and recommended resources**

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28420>