# Information about the subject

**Degree:** Bachelor of Science Degree in Veterinary Medicine

**Faculty:** Faculty of Veterinary Medicine and Experimental Sciences

**Code:** 1260306 **Name:** Pharmacology and Toxicology

**Credits:** 6,00 **ECTS Year:** 3 **Semester:** 1

**Module:** Module of Clinical Sciences and Animal Health

**Subject Matter:** Pharmacology and Therapeutics **Type:** Compulsory

**Department:** -

**Type of learning:** Classroom-based learning

**Languages in which it is taught:** Spanish

**Lecturer/-s:**

# Module organization

## Module of Clinical Sciences and Animal Health

| Subject Matter | ECTS | Subject | ECTS | Year/semester |
|---|---|---|---|---|
| Alterations in Structure and Function, and Fundamentals of Diagnosis | 36,00 | Clinical diagnostic techniques I (Clinical Propedeutics) | 6,00 | 3/1 |
| | | Clinical Diagnostic Techniques II (Imaging Diagnosis) | 6,00 | 3/1 |
| | | Histopathology and General Pathological Anatomy | 6,00 | 2/1 |
| | | Physiopathology and general integrated Pathology I | 6,00 | 2/1 |
| | | Physiopathology and general integrated Pathology II | 6,00 | 2/2 |
| | | Special pathological anatomy | 6,00 | 2/2 |
| Pharmacology and Therapeutics | 12,00 | Pharmacology and Toxicology | 6,00 | 3/1 |
| | | Pharmacotherapy, preventive medicine and veterinary hygiene | 6,00 | 5/1 |
| Clinical Sciences and Animal Health | 60,00 | Clinic and health in equines | 6,00 | 3/2 |
| | | Clinic and health in water animals | 6,00 | 5/1 |
| | | Clinic and health in wild and exotic animals | 6,00 | 3/2 |

| | | | |
|---|---|---|---|
| Clinical Sciences and Animal Health | Clinic and health on the farm I | 6,00 | 4/1 |
| | Clinic and health on the farm II | 6,00 | 4/2 |
| | Epidemiology | 6,00 | 3/1 |
| | Pet Clinic | 6,00 | 3/2 |
| | Reproduction and Obstetrics | 6,00 | 3/1 |
| | Veterinary Surgery I | 6,00 | 3/2 |
| | Veterinary Surgery II | 6,00 | 4/1 |

## Recommended knowledge

It is recommended that the student has acquired knowledge in animal physiology to understand more clearly the mechanism of action and pharmacokinetics of the drugs used in therapeutics, as well as the influence of toxic substances on the different systems present in the animal environment.

## Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

| | |
|---|---|
| R1 | Solving and explaining pharmacokinetic and pharmacodynamic aspects of drugs based on previously acquired physiological knowledge. |
| R2 | Knowing all the therapeutic groups and their possible applications in the professional context. |
| R3 | Knowing and identifying possible adverse reactions and pharmacological interactions derived from the administration of drugs. |
| R4 | Identifying chemical substances and/or physical agents that contaminate and may have harmful effects on public or animal health. |
| R5 | Knowing and identifying the symptoms or lesions related to the toxic effects caused by different chemical and or physical agents. |
| R6 | Applying the theoretical and practical knowledge acquired to solving problems in the toxicological field. |
| R7 | Correct use of language as well as correct writing and data presentation. |
| R8 | The student collaborates with the teacher and classmates throughout the learning process: he or she attends theoretical, practical or tutorial sessions; works in groups; is respectful in his/her treatment towards others; complies with the organizational rules of the module to the benefit of all. |

## Competencies

**Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):**

| BASIC | | Weighting | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| CB2 | Capacity to apply knowledge to work or occupation in a professional way and have the competences that are proved by preparing and arguing topics and problem-solving in their specific field of study. | | | | x |
| CB3 | Capacity to gather and interpret relevant data usually within their specific field of study and capacity to make judgments that include reflection on relevant social, scientific or ethical issues. | | | | x |
| CB4 | Capacity to communicate information, ideas, problems and solutions at specialist and non-specialist levels. | | | | x |

| GENERAL | | Weighting | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| CG0 | Capacity to speak well in public. | x | | | |
| CG2 | Understanding and applying prevention, diagnosis and individual or collective treatment , and control of animal diseases, individually or in groups, with special attention to zoonoses. | | | | x |
| CG5 | Understanding and applying laws, regulations and administrative provisions in all areas of the veterinary profession and public health, understanding the ethical implications of health in a changing global context. | | x | | |
| CG6 | Developing professional practice, acquiring skills related to teamwork, with an efficient use of resources and quality management. | | | x | |
| CG7 | Identifying emerging risks in all areas of the veterinary profession. | | | | x |

| SPECIFIC | | Weighting | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| E28 | Knowing and applying the clinical study of patients and medical, surgical or hygienic-dietary treatments required, as well as sporadic diseases affecting groups. | x | | | |
| E35 | Knowing and applying the general pharmacological bases and study of different types of drugs. | | | | x |
| E36 | Knowing and applying pharmacotherapy. | | | x | |
| E37 | Knowing and applying the identification and study of natural and synthetic toxicants. | | | | x |
| E38 | Knowing and applying animal and environmental toxicology. | | | | x |
| E42 | Knowing and applying the promotion of collective health in animals, including wildlife, in order to maximize the economic performance in a social, ethical and healthy way. | | x | | |
| E43 | Knowing and applying technical measures and regulations for the prevention, control and eradication of animal diseases. | x | | | |

| TRANSVERSAL | | Weighting | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| T1 | Capacity of analysis, synthesis, implementation of knowledge for problem-solving and decision-making. | | | | x |
| T2 | Understanding and applying the scientific method to professional practice including evidence-based medicine. | | | x | |
| T3 | Basic knowledge of the veterinary profession: legal, economic, administrative, planning and time management issues and the veterinarians' society together with the importance of monitoring quality, standardization and protocols of veterinary practice. | | x | | |
| T4 | Mastering fluency in oral and written mother tongue communication, listening and responding effectively using a language appropriate to audience and context. | | | x | |
| T6 | Using information technology to communicate, share, search for, collect, analyze and manage information, especially related to the veterinarian practice. | | x | | |

| | | | | |
|---|---|---|---|---|
| T8 | Efficient and effective work, both independently and as a member of a multidisciplinary team or unit, showing respect, appreciation and sensitivity to the work of others. | | | x |
| T9 | Keeping an ethical behaviour in the exercise of given responsibilities toward the profession and society. | x | | |
| T10 | Ability to learn, to research, and to be aware of the need to keep knowledge updated, and attending training programs. | | | x |

## Assessment system for the acquisition of competencies and grading system

| Assessed learning outcomes | Granted percentage | Assessment method |
|---|---|---|
| R1, R2, R3, R4, R5, R6 | 40,00% | Written assessment of acquired knowledge and skills. The test may consist of a series of open-ended questions or multiple-choice questions about the theoretical contents of the module and/or practical exercises (problem-solving). |
| R1, R2, R3, R4, R5, R6 | 15,00% | Evaluation of the use of the practical lessons in the classroom, of problems or computer science, seminars and tutorials, by means of participation, computer-supported problem solving and the elaboration of the corresponding reports. |
| R1, R2, R3, R4, R5, R6 | 15,00% | Evaluation of the practical laboratory work, which must demonstrate the competences acquired by the student and his or her ability to use them to solve the different situations and problems that arise in a laboratory; this assessment may consist of one of the following methods, or a combination of several of them: an individual written test, the individual or group performance of a laboratory experience, the delivery of an individual or group report on the work carried out in the laboratory. |
| R1, R2, R4, R5, R6 | 10,00% | Evaluation of group work through a system of continuous assessment throughout the course based on the delivery of assignments the objectives and content of which will be proposed by the teacher. |
| R1, R2, R3, R4, R5, R6 | 20,00% | Evaluation of activities in which the student must do some research individually and structure information related to each of the topics through a system of continuous assessment throughout the course based on the delivery of papers, the objectives and contents of which will be proposed by the teacher. |

**Observations**

**MINIMUM REQUIREMENTS:** This subject is divided in two sections; Pharmacology and Toxicology, the first component will represent 60% of the overall grade meanwhile the second one 40%. In order to take into account these percentages, both must be approved at least with a grade of 5 out of 10
(1) The evaluation of the theoretical contents will be carried out through a written test that will represent 40% of the final grade. The exam will consist of multiple-choice questions (60-100). Each question with 4 options, of which only one will be correct. Every 3 incorrect questions will subtract the value of a correct one. It will be essential to pass this exam to consider the rest of the grades. In case of not approving it will suppose the suspension of the subject.
(2) The evaluation of seminars and practical classes, both those carried out in the classroom and in the laboratory, will be carried out by means of an exam that will be carried out the same day of the written test corresponding to the evaluation of the theoretical contents (1). The attendance to the practical sessions and seminars will be obligatory. The dates of completion of the same will be communicated to the students with sufficient advance. It will not be possible to repeat the practice or seminar outside the established calendar.
(3) The evaluation of group work contributes 10% to the final grade. The work will be proposed by the teacher and the groups will be composed of 5 students maximum.
(4) Passed marks for the practical exam and seminar exam as well as group work will be retained for ONE CONSECUTIVE academic year ONLY.
Exam revision: After the publications of the marks, students will have access to the exam revision timetables on the intranet. The revision date and time must be respected except in the case of extraordinary circumstances that the lecturer is informed in advance. Exams will not shown outside these times.

**MENTION OF DISTINCTION:**
According to Article 22 of the Regulations governing the Evaluation and Qualification of UCV Courses, the mention of "Distinction of Honor" may be awarded by the professor responsible for the course to students who have obtained, at least, the qualification of 9 over 10 (“Sobresaliente”). The number of "Distinction of Honor" mentions that may be awarded may not exceed five percent of the number of students included in the same official record, unless this number is lower than 20, in which case only one "Distinction of Honor" may be awarded.

## Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

M1 On-site training activity aimed primarily at acquiring knowledge acquisition skills. It is characterised by the fact that students are spoken to. Also called master class or exposition, it refers to the oral presentation made by the teacher, (with the support of blackboard, a computer and a projector for the display of texts, graphs, etc.), in front of a group of students. They are expository, explanatory or demonstrative sessions of contents. The size of the group is determined by the limit or physical capacity of the classroom; therefore, it is a single group.

M2 On-site training activity aimed primarily at obtaining knowledge application and research skills. Knowledge is built through interaction and activities. The activity consists of supervised monographic sessions with shared participation (teachers, students, experts). The size of the group is variable, from one large group to various small groups, with a minimum of 6 students to ensure interaction. The evaluation will be based on follow-up records kept by the teacher. Participation and the development of the capacity to problematize should be taken into account.

M3 On-site group-work training activity oriented toward problem solving under the supervision of a teacher. It would correspond to "Animal-free supervised practical work", type e1, from the European evaluation of EAEVE. The size of the group is variable, in a range of 10 to 20 students, to differentiate it from a master class.

M4 On-site training activity in groups that takes place in the classroom. It includes working with documents and formulating ideas without handling animals, organs, objects, products, or corpses (e.g., work with articles or documents, clinical case studies, diagnostic analyses, etc.). It would correspond to "Animal-free supervised practical work", type e1, from the European evaluation of EAEVE. The size of the group is variable, in a range of 10 to 20 students.

M5 On-site training activity in groups that takes place in the Computer Lab where the computer is used as support for learning. It includes work with computer models, specific software, Web queries, etc. It would correspond to "Animal-free supervised practical work", type e1, from the European evaluation of EAEVE. The size of the group is variable, in a range of 10 to 20 students.

M6 On-site training activity in groups carried out in the laboratory. It includes the sessions where the students develop laboratory experiments, make dissections or use the microscopes for the study of histological or histopathological samples actively and autonomously, under the supervision of the professor. It also includes work with healthy animals, objects, products, corpses (e.g., animal handling, bacteriological practices, physiology or biochemistry, meat inspection, etc.). It would correspond to the "Supervised practical non-clinical animal work" type e2 of the European evaluation of EAEVE. The size of the group is variable, in a range of 10 to 20 students.

M8 A set of on-site training activities carried out by the teacher to provide personalised attention to the student or in small groups with the aim of reviewing and discussing the materials and topics presented in classes, seminars, readings, carrying out projects, etc. The aim is to ensure a truly comprehensive education of the student rather than a mere transfer of information. It is, therefore, a personalized assistance relationship in which the tutor assists, facilitates and guides one or more students in the learning process.

M9 Set of processes that attempt to evaluate the learning outcomes of students expressed in terms of acquired knowledge, capacities, skills or abilities developed and manifested attitudes. It covers a wide range of activities that can be developed for students to demonstrate their training (e.g. written, oral and practical tests, projects or assignments). It also includes the Official Calls.

M10 Autonomous training activity, including activities and coursework, bibliographic searches. The results obtained from unsupervised group and teamwork will be evaluated, with particular attention paid at the time of evaluation to the acquisition of specific knowledge development skills through group work.

M11 Autonomous training activities related to personal study, or the preparation of individual course assignments. The individual preparation of readings, essays, problem solving, papers, reports, etc. will be evaluated through presentations or submissions during theoretical classes, practical classes, seminars and/or tutorials. The evaluation of the submitted papers will consider the structure of the paper, the quality of the documentation, originality, spelling and presentation.

## IN-CLASS LEARNING ACTIVITIES

| | LEARNING OUTCOMES | HOURS | ECTS |
|---|---|---|---|
| Theoretical lessons (TL)<br>M1, M9 | R1, R2, R3, R4, R5, R6, R7, R8 | 29,00 | 1,16 |
| Seminars (S)<br>M1, M2, M9 | R1, R2, R3, R4, R5, R6, R7, R8 | 17,00 | 0,68 |
| In-Classroom Practice (ICP)<br>M4, M8, M11 | R1, R2, R3, R4, R5, R6, R7, R8 | 6,00 | 0,24 |
| Laboratory Practice (LP)<br>M6 | R1, R4, R6, R7, R8 | 4,00 | 0,16 |
| Tutorial<br>M8 | R1, R2, R3, R4, R5, R6 | 2,00 | 0,08 |
| Evaluation (Ev)<br>M9 | R1, R2, R3, R4, R5, R6, R7 | 2,00 | 0,08 |
| **TOTAL** | | **60,00** | **2,40** |

## LEARNING ACTIVITIES OF AUTONOMOUS WORK

| | LEARNING OUTCOMES | HOURS | ECTS |
|---|---|---|---|
| Group work<br>M4, M6, M8, M10 | R1, R2, R3, R4, R5, R6, R7, R8 | 15,00 | 0,60 |
| Individual work<br>M11 | R1, R2, R3, R4, R5, R6, R7 | 75,00 | 3,00 |
| **TOTAL** | | **90,00** | **3,60** |

## Description of the contents

Description of the necessary contents to acquire the learning outcomes.

### Theoretical contents:

| Content block | Contents |
|---|---|
| UNIT I. GENERAL PHARMACOLOGY | Presentation of course.<br>1. Introduction to the study of pharmacology. Concept and objectives.<br>2. General mechanisms of action of drugs. Drug-receptor interactions.<br>3. ADME process: Absorption, distribution, metabolism and elimination of drugs.<br>4. Routes of drug administration. Therapeutic guidelines.<br>5. Toxicity and Adverse Drug Reactions. Pharmacological interactions |
| UNIT II. CLINICAL PHARMACOLOGY AND VETERINARY THERAPEUTICS | 6. Pharmacology of the central and peripheral nervous system.<br>7. Pharmacology of pain, inflammation and thermoregulation.<br>8. Pharmacology of the cardiovascular and renal systems.<br>9. Pharmacology of hemostasis.<br>10. Pharmacology and therapeutics of the respiratory system.<br>11. Pharmacology and therapeutics of the digestive system.<br>12. Anti-infectious chemotherapy.<br>13. Endocrine pharmacology<br>14. Antineoplastic pharmacology |
| UNIT III. TOXICOLOGY | 15. Fundamentals of toxicology.<br>16. Clinical Toxicology I: Vegetables.<br>17. Clinical Toxicology II: Pesticide<br>18. Clinical toxicology III: Metals and metalloids.<br>19. Clinical Toxicology IV: Medications commonly used in the domestic environment.<br>20. Clinical toxicology V: Mycotoxins. Toxinology |

| | |
|---|---|
| UNIT IV. PRACTICAL CONTENT/SEMINARS | 21. Determination of nitrite levels in water.<br>22. Monocompartmental model: Rapid single-dose intravenous administration.<br>23. Drug administration. Dose calculation<br>24. Veterinary Pharmacovigilance (AEMPS) |

## Organization of the practical activities:

| | Content | Place | Hours |
|---|---|---|---|
| PR1. | Drug administration and dose calculation. | Lecture room | 2,00 |
| PR2. | Veterinary pharmacovigilance (AEMPS). | Lecture room | 2,00 |
| PR3. | Determination of nitrite levels in water | Laboratory | 2,00 |
| PR4. | Monocompartmental model of drug distribution | Laboratory | 2,00 |
| PR5. | Processing of data obtained in laboratory practices | Computer | 4,00 |

## Temporary organization of learning:

| Block of content | Number of sessions | Hours |
|---|---|---|
| UNIT I. GENERAL PHARMACOLOGY | 3,00 | 6,00 |
| UNIT II. CLINICAL PHARMACOLOGY AND VETERINARY THERAPEUTICS | 17,00 | 34,00 |
| UNIT III. TOXICOLOGY | 8,00 | 16,00 |
| UNIT IV. PRACTICAL CONTENT/SEMINARS | 2,00 | 4,00 |

## References

**PHARMACOLOGY**

ADAMS, H.R. Farmacología y Terapéutica Veterinaria. 2ª ed. Edimar Editores. 2003.

BONAGURA J.D., TWEDT D.C. KIRK, Terapéutica veterinaria actual, XIV.Elsevier España, S.L.U. Barcelona. 2009.

BOTANA, L.M. Farmacología Veterinaria: fundamentos y aplicaciones terapéuticas. Ed. Medica Panamericana, Madrid 2019.ISBN: 978-84-9110-533-6

CIGUERE, S., PRESCOTT, J.F., DOWLING, P.M. Antimicrobial Therapy in Veterinary Medicine. 5th Edition Wiley-Blackwell, 2013.DOI:10.1002/9781118675014

FLOREZ, J. Farmacología humana, 6ªed.Masson. Barcelona. 2013.

GOODMAN & GILMAN. The pharmacological basis of therapeutics. 13ªed. McGraw-Hill Interamericana. 2019. ISBN: 9781456263560

KATZUNG, B.G., VANDERAH, TW.. Farmacología básica y clínica. Ed. McGraw-Hill, 2021. ISBN: 9786071515810

LORENZO, P., MORENO, A., LEZA, J.C., LIZASOAIN, I., MORO, M.A., PORTOLES, A. Velazquez. Farmacología básica y clínica. 19ª Ed.Médica Panamericana. EAN: 9786078546077. Madrid 2018.

LÜLLANN, H., MOHR, K., HEIN, L. Farmacología. Texto y Atlas. 6ªEd. Medica Panamericana, 2010.

RANG & DALE´S Pharmacology. 9ªed. Ed. Elsevier, Madrid. 2020

RANG y DALE. Flashcards de Farmacología. 2ªed. Ed Elsevier, 2021

**TOXICOLOGY**

GUPTA, RC. Veterinary Toxicology: Basic and Clinical Principles. 3ªed. Ed.Academic Press. 2018. ISBN: 9780128114100

KLAASSEN, C.D. "Casarett & Doull S, Essentials of toxicology, fourth edition. Ed. McGraw-Hill, 2021. ISBN 9781260452303

OSWEILER, G.D., HOVDA, L. BRUTLAG, A., BLACKWELL'S, J.A. “Blackwell´s Five-Minute Veterinary Consult Clinical Companion: Small Animal Toxicology. 2ª ed. Ed. John Wiley and sons Ltd. 2016. ISBN: 9781119036548

PETERSON, M.E., TALCOTT, P.A. Small Animal Toxicology. 3ª ed Ed. Elsevier Saunders, 2012. ISBN: 978-1455707171

REPETTO, M, REPETTO, G. toxicología fundamental. 4ª ed. Ediciones Díaz de Santos, S.A. 2013. ISBN: 978-8479788988

RODER J.D. Manual de toxicología veterinaria. Multimedica Ed. Vet. 2002.

# Addendum to the Course Guide of the Subject

Due to the exceptional situation caused by the health crisis of the COVID-19 and taking into account the security measures related to the development of the educational activity in the Higher Education Institution teaching area, the following changes have been made in the guide of the subject to ensure that Students achieve their learning outcomes of the Subject.

## Situation 1: Teaching without limited capacity (when the number of enrolled students is lower than the allowed capacity in classroom, according to the security measures taken).

In this case, no changes are made in the guide of the subject.

## Situation 2: Teaching with limited capacity (when the number of enrolled students is higher than the allowed capacity in classroom, according to the security measures taken).

In this case, the following changes are made:

### 1. Educational Activities of Onsite Work:

**All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject** will be made through a simultaneous teaching method combining onsite teaching in the classroom and synchronous online teaching. Students will be able to attend classes onsite or to attend them online through the telematic tools provided by the university (videoconferences). In any case, students who attend classes onsite and who attend them by videoconference will rotate periodically.

In the particular case of this subject, these videoconferences will be made through:

[X] Microsoft Teams

[X] Kaltura

## Situation 3: Confinement due to a new State of Alarm.

In this case, the following changes are made:

### 1. Educational Activities of Onsite Work:

**All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject**, as well as the group and personalized tutoring, will be done with the telematic tools provided by the University, through:

| | |
|---|---|
| X | Microsoft Teams |
| X | Kaltura |

Explanation about the practical sessions:

## 2. System for Assessing the Acquisition of the competences and Assessment System

**ONSITE WORK**

**Regarding the Assessment Tools:**

[X] The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.

[ ] The following changes will be made to adapt the subject's assessment to the online teaching.

| Course guide | | Adaptation | |
|---|---|---|---|
| Assessment tool | Allocated percentage | Description of the suggested changes | Platform to be used |

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

**Comments to the Assessment System:**