



## 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:** Basic and Cross-disciplinary Sciences

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

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

### Lecturer/-s:

1263A	<u>Maria Elena Perez Sayas</u> <b>(Responsible Lecturer)</b>	elena.perez@ucv.es
	<u>Celia Almela Camañas</u>	celia.almela@ucv.es
1263B	<u>Maria Elena Perez Sayas</u> <b>(Responsible Lecturer)</b>	elena.perez@ucv.es
	<u>Celia Almela Camañas</u>	celia.almela@ucv.es
CAUR	<u>Maria Elena Perez Sayas</u> <b>(Responsible Lecturer)</b>	elena.perez@ucv.es



## 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:

(1) **Evaluation of THEORETICAL CONTENT** will be carried out by means of a written test that will represent 40% of the final grade.

Exam structure: 60-100 multiple-choice questions, 50% corresponding to Pharmacology and 50% corresponding to Toxicology (each question will have 4 options, of which only one will be correct). Every 3 incorrect answers will be subtracted the value of a correct one. It will be essential to pass this exam to take into account the rest of the grades. Failure to pass the exam will result in failure of the course.

(2) **Evaluation of SEMINARS AND PRACTICALS**, both those carried out in the classroom and in the laboratory, will be carried out by means of an exam that will take place on the same day of the written test corresponding to the evaluation of the theoretical contents (1). Represent 30% of the final grade.

Attendance to the practical sessions and seminars will be compulsory. The dates of these sessions and seminars will be communicated to the students sufficiently in advance. It will not be possible to repeat the practical or seminar outside the established schedule.

(3) **Evaluation of GROUP WORK** contributes 10% to the final grade. Students will work on cases proposed by the professor in a collaborative way. The student, as an instrument of continuous evaluation, will provide throughout the course relevant information on the evolution of their work. The evaluation of the same will be carried out through a rubric that the student will know from the assignment of the subject. The work groups will be composed of a maximum of 5 students.

(4) Continuous evaluation through **INDIVIDUAL ACTIVITIES**; it represents 20% of the final grade. It will consist of activities/questionnaires through an on-line platform or in face-to-face mode whose objective is to evaluate the student's progress throughout the course.

The evaluation system will be identical for ERASMUS or SICUE students. it will not be possible to certify SEPARATELY PHARMACOLOGY or TOXICOLOGY, since it is a SINGLE subject that includes both disciplines.

Students with APPROVED seminars, practicals and (or group work): marks will be retained ONLY for one CONSECUTIVE academic year (not including intercalated year, Erasmus or Sicue year).

Students with any of the above items SUSPENDED: you will not be obliged to attend practical classes or seminars if you have already attended them, however, if you are interested in doing so, you MUST contact the professors.

If you did not submit your internship report at the time, the student must retake the internship.

NO internship report will be accepted if it has not been completed.

**"THIS SUBJECT WILL NOT BE EVALUATED BY MEANS OF A SINGLE EVALUATION"**

**"ATTENDANCE TO THE INTERNSHIP IS MANDATORY"**

**"THE USE OF TOOLS BASED ON ARTIFICIAL INTELLIGENCE (AI) IS SUBJECT TO THE DISCRETION OF THE PROFESSOR, WHO COULD ESTABLISH LIMITS OR SPECIFIC CONDITIONS ACCORDING TO THE TRAINING OR EVALUATION ACTIVITY"**

**Exam revision:** after the publication of the grades, students will have access to the exam revision schedules through the intranet. The date and time of revision must be respected except in special



circumstances.

## MENTION OF DISTINCTION:

In accordance with the regulations governing the assessment and grading of subjects in force at UCV, the distinction of "Matrícula de Honor" (Honours with Distinction) may be awarded to students who have achieved a grade of 9.0 or higher. The number of "Matrículas de Honor" (Honours with Distinction) may not exceed five percent of the students enrolled in the group for the corresponding academic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" (Honours with 9 Distinction) may be awarded. Exceptionally, these distinctions may be assigned globally across different groups of the same subject. Nevertheless, the total number of distinctions awarded will be the same as if they were assigned by group, but they may be distributed among all students based on a common criterion, regardless of the group to which they belong. The criteria for awarding "Matrícula de Honor" (Honours with Distinction) will be determined according to the guidelines stipulated by the professor responsible for the course, as detailed in the "Observations" section of the evaluation system in the course guide.

## 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) M1, M9	R1, R2, R3, R4, R5, R6, R7, R8	29,00	1,16
Seminars (S) M1, M2, M9	R1, R2, R3, R4, R5, R6, R7, R8	17,00	0,68
In-Classroom Practice (ICP) M4, M8, M11	R1, R2, R3, R4, R5, R6, R7, R8	6,00	0,24
Laboratory Practice (LP) M6	R1, R4, R6, R7, R8	4,00	0,16
Tutorial M8	R1, R2, R3, R4, R5, R6	2,00	0,08
Evaluation (Ev) M9	R1, R2, R3, R4, R5, R6, R7	2,00	0,08
<b>TOTAL</b>		<b>60,00</b>	<b>2,40</b>

## LEARNING ACTIVITIES OF AUTONOMOUS WORK

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



## Description of the contents

Description of the necessary contents to acquire the learning outcomes.

### Theoretical contents:

Content block	Contents
UNIT I. GENERAL PHARMACOLOGY	<p>Presentation of course.</p> <ol style="list-style-type: none"><li>1. General principles of pharmacology: Drug-receptor interactions. LADME process.</li><li>2. Routes of drug administration.</li><li>3. Adverse Drug Reactions. Pharmacological interactions</li></ol>
UNIT II. CLINICAL PHARMACOLOGY AND VETERINARY THERAPEUTICS	<ol style="list-style-type: none"><li>4. Pharmacology of the central and peripheral nervous system.</li><li>5. Pharmacology of pain, inflammation and thermoregulation.</li><li>6. Pharmacology of the cardiovascular and renal systems.</li><li>7. Pharmacology of hemostasis.</li><li>8. Pharmacology and therapeutics of the respiratory system.</li><li>9. Pharmacology and therapeutics of the digestive system.</li><li>10. Anti-infectious chemotherapy.</li><li>11. Endocrine pharmacology</li><li>12. Antineoplastic pharmacology</li></ol>
UNIT III. TOXICOLOGY	<ol style="list-style-type: none"><li>13. Fundamentals of toxicology.</li><li>14. Plant Toxicology.</li><li>15. Environmental and Food Toxicology.</li><li>16. Toxinology.</li><li>17. Toxic residues in animals and their products.</li></ol>
UNIT IV. PRACTICAL CONTENT/SEMINARS	<ol style="list-style-type: none"><li>18. Determination of nitrite levels in water.</li><li>19. Monocompartmental model: Rapid single-dose intravenous administration.</li><li>20. Drug administration. Dose calculation</li><li>21. Veterinary Pharmacovigilance (AEMPS)</li></ol>



## 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	15,00	30,00
UNIT III. TOXICOLOGY	10,00	20,00
UNIT IV. PRACTICAL CONTENT/SEMINARS	2,00	4,00





## References

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### TOXICOLOGY

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## Course guide

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6. Roder J.D. **MANUAL DE TOXICOLOGÍA VETERINARIA**. 1ªEd. Grafica in Multimedica, 2002.

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