



## Information about the subject

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

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

**Code:** 1260109 **Name:** Physico-chemical fundamentals of veterinary medicine

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

**Module:** Module of Common Basic Training

**Subject Matter:** Physics and Chemistry **Type:** Compulsory

**Department:** -

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

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

**Lecturer/-s:**



## Module organization

### Module of Common Basic Training

Subject Matter	ECTS	Subject	ECTS	Year/semester
Statistics	6,00	Biometrics and Statistics	6,00	1/1
Biology	6,00	Animal and Plant Biology	6,00	1/1
Biochemistry	6,00	Biochemistry	6,00	1/2
Animal Anatomy	18,00	Animal Anatomy I and Embryology	6,00	1/1
		Animal Anatomy II	6,00	1/2
		Animal Cytology and Histology	6,00	1/2
Animal Physiology	12,00	Animal Physiology I	6,00	2/1
		Animal Physiology II and Immunology	6,00	2/2
Genetics	6,00	Genetics	6,00	1/2
Animal Domestication	6,00	Animal Domestication (Ethnology, Ethology and Animal Welfare)	6,00	1/2
Biological Agents of Interest in Veterinary Medicine	12,00	Veterinary Microbiology	6,00	2/2
		Veterinary Parasitology	6,00	2/1
Veterinary Medicine and Society	6,00	Veterinary Regulations and Legislation, Social Morality and Professional Deontology	6,00	5/1



Physics and Chemistry	6,00	Physico-chemical fundamentals of veterinary medicine	6,00	1/1
-----------------------	------	--	------	-----

## Recommended knowledge

None

## 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 The student knows the physical-chemical principles of biological processes.
- R2 Acquiring knowledge of fluid statics and mechanics, optics, vision and waves applied to veterinary sciences.
- R3 Learning the importance of knowing different chemical processes to understand different physiological processes.
- R4 The student knows physicochemical methods to study compounds of interest in veterinary medicine.
- R5 The student has the ability to work in a chemistry laboratory correctly performing the basic operations and observing the corresponding safety standards.
- R6 The student searches bibliographic information from different sources and knows how to analyse it with a critical and constructive spirit.
- R7 The student is able to produce documents on the subject and work in a team.



## 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
CB1 Students must show that they have and understand knowledge in a field of study that is based on general secondary education on a level that, although supported by advanced text books, includes also some aspects that involve knowledge belonging to the vanguard of their field of study.				X

SPECIFIC	Weighting			
	1	2	3	4
E2 Understanding and analyzing biological processes in the field of veterinary.				X

TRANSVERSAL	Weighting			
	1	2	3	4
T1 Capacity of analysis, synthesis, implementation of knowledge for problem-solving and decision-making.				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	
T7 Ability to adapt to new situations, self-critical ability, being aware of personal limitations and understanding when and where seeking and obtaining advice and professional help.			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 |
| 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	60,00%	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, R6, R7	5,00%	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.
R4, R5, R6, R7	20,00%	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, R3, R4, R6, R7	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, R7	5,00%	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

·The student must obtain a minimum score of 5 in the test to pass the subject. If the student does not obtain the score of 5 on both tests (the theoretical and practical block), the qualification of the approved test is saved during the next course.

·At the end of the physics block there will be a partial exam of this part, being voluntary for the student. This partial will be eliminatory if the grade obtained is equal to or greater than 5. In this case, the student will only have to take the exam in the first call for the chemistry block and must obtain a grade equal to or greater than 5 to pass the subject. In the event that the student does not obtain a grade higher than 5 in the chemistry part having passed the partial, the partial grade will be kept in the second call.

·If the student decides not to take the partial physics exam or takes it, but does not obtain a minimum grade of 5, they must take the entire subject in the first call exam taking into account the following criteria to pass it: in order to pass the subject, the student must obtain a minimum grade of 4 points in the part of chemistry and physics to 3 in average is needed.

·But the overall score that is obtained after carrying out the percentages of each party should be at least 5 to pass the subject, but with minimums, the student will NOT be approved since the overall grade obtained after performing the percentages of each part (2/3 chemistry grade and 1/3 physics grade) must be at least 5 to pass the exam.

·It is necessary in any of the blocks of the examination result units are correct for scoring exercises.

·Those students who for various reasons do not attend the assessment of the subject on the official date, will do the tests with an oral exam.

·It's essential to have approved the part / exercises "solutions" to pass the subject.

·Attendance to practical laboratory classes is mandatory. For each day of absence to practices the student will be penalized 1.5 points lower on the note for the practical test.

·It's not allowed the delivery of exercises, laboratory report and homework outside the established delivery period.

## 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) M1	R1, R2, R3, R4	30,00	1,20
Problem-solving Practice (PSP) M3	R1, R2, R3, R4, R7	15,00	0,60
In-Classroom Practice (ICP) M4	R1, R2, R3, R4, R7	2,00	0,08
Laboratory Practice (LP) M6	R1, R2, R3, R4, R5, R6, R7	8,00	0,32
Tutorial M8	R6, R7	3,00	0,12
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 M10	R1, R2, R3, R4, R5, R6, R7	20,00	0,80
Individual work M11	R1, R2, R3, R4, R5, R6, R7	70,00	2,80
<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
DIDACTIC UNIT I: physical principles of veterinary	Lecture 1. Physics introduction to veterinary: forces, vectors and statics. The muscles and bones Lecture 2. Hydrostatics and hemodynamics: circulatory system and lung respiration. Lecture 3. Waves: Doppler effect, ultrasound and ecography. Lecture 4. Electrostatics: Ohm's law, electric current and resistance. The cells of the nervous system. Lecture 5. Electromagnetism: the magnetic field, electromagnetic radiation, its spectrum and interaction with matter. Magnetic resonance and X-rays.
DIDACTIC UNIT II: chemical principles of veterinary	Lecture 6. Chemistry introduction to veterinary: Classification of matter. Solutions. Lecture 7. Models for the structure of the atom. Lecture 8. Periodic systems of the elements. Lecture 9. The chemical bond. Lecture 10. Chemical equilibrium. Lecture 11. Organics chemistry and the main functional groups. Lecture 12. Physical-chemical methods applied to the veterinary sciences.
DIDACTIC UNIT III: laboratory	1 Introduction to the chemistry laboratory. Standards and safety in the laboratory 2 Preparing solutions and making dilutions 3 pH measurement 4 Density measurement



## Organization of the practical activities:

	Content	Place	Hours
PR1.	Introduction to good laboratory practices	Lecture room	2,00
PR2.	Solutions and dilutions	Laboratory	2,00
PR3.	Acid-base balance. pH measurement	Laboratory	2,00
PR4.	Physical	Laboratory	2,00
PR5.	Laboratory exam	Laboratory	2,00
PR6.	physics problems	Lecture room	5,00
PR7.	chemistry problems	Lecture room	10,00

## Temporary organization of learning:

Block of content	Number of sessions	Hours
DIDACTIC UNIT I: physical principles of veterinary	9,00	18,00
DIDACTIC UNIT II: chemical principles of veterinary	16,00	32,00
DIDACTIC UNIT III: laboratory	5,00	10,00



## References

### Physics

- Levine N. Físicoquímica. Volumen 1. Ed. Mc Graw-Hill; 2004
- Levine N. Físicoquímica. Volumen 2. Ed. Mc Graw-Hill; 2004
- Tipler PA. FÍSICA. Ed. Reverté
- Cromer AH. FÍSICA PARA LAS CIENCIAS DE LA VIDA. Ed. Reverté
- Cussó F, López C y Villar R. Física de los procesos biológicos. Ed. Ariel; 2004

### Chemistry

- Pimentel C. Pimentel, Química: una ciencia experimental. Ed. Reverté ;1972
- Shiver DF, Atkins PW y. Langford CH. Química Inorgánica. Ed. Reverté ;2000
- Douglas E. Conceptos y módulos de química inorgánica. Ed. Reverté;1998
- López I, Cuestiones de química general. Universidad de Málaga; 2009
- Shakhashiri Z. Equilibrio químico– México
- Purcell F. Estequiometría - México- Chang R. Química. Ed. Mc Graw-Hill; 1999
- Losada M., Vargas M.A. Los Elementos y Moléculas de la vida, Introducción a la Química Biológica y Biología Molecular. 2ª Parte. Ed. Rueda.
- Mahan BH. Química. Curso Universitario. Ed. Fondo Educativo Interamericano.
- Olba A. Química General. Equilibrio i canvi. Ed. PUV
- Fredric M. Menger. Química orgánica. Colombia Fondo Educativo Interamericano 1976



## 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:

Microsoft Teams

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:

Microsoft Teams

Kaltura

Explanation about the practical sessions:

In the case of confinement due to a new alarm case, all the practical sessions that require the presence of the student will be moved to a new date as soon as the health situation allows.

Whenever possible, the face-to-face activities will be replaced by video-tutorials of the techniques to be used, and the analysis and guided discussion of the results will be carried out from the data provided by the teacher.



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

### ONSITE WORK

#### Regarding the Assessment Tools:

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: