



## Information about the subject

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

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

**Code:** 1262512 **Name:** Reproductive Technology

**Credits:** 6,00 **ECTS** **Year:** The course is not offered this academic year **Semester:** 1

**Module:** Module of elective courses

**Subject Matter:** Animal Reproduction and Production **Type:** Elective

**Department:** -

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

**Languages in which it is taught:**

**Lecturer/-s:**



## Module organization

### Module of elective courses

Subject Matter	ECTS	Subject	ECTS	Year/semester
Intensifications per animal group	24,00	Specialisation in Clinic of Wild and Exotic Animals	6,00	5/1
		Specialisation in the Equine Clinic	6,00	This elective is not offered in the academic year 23/24
		Specialisation in treatment of small animals	6,00	5/1
		Surgical pathology of the musculoskeletal system of small animals	6,00	5/1
Animal Reproduction and Production	30,00	Fighting bull	6,00	This elective is not offered in the academic year 23/24
		Reproductive Technology	6,00	This elective is not offered in the academic year 23/24
		Specialisation in animal production	6,00	5/1
		Specialisation in animal research	6,00	This elective is not offered in the academic year 23/24
		Specialisation in aquaculture	6,00	This elective is not offered in the academic year 23/24



Feeding	12,00	Microbiology in Food	6,00	This elective is not offered in the academic year 23/24
		Quality management in the agri-food industry	6,00	This elective is not offered in the academic year 23/24

## Recommended knowledge

To have knowledge of Reproduction and Obstetrics, Clinic in Companion Animals, Clinic and Health of equines, Clinic and Health of Wild and Exotic Animals, Clinic and Health of Aquatic Animals, Clinic and Health of Farms Animals I, Clinic and Health of Farms Animals II.

## 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 and understands with a critical attitude the concepts that are included in the syllabus/contents of the module of reproduction technology.
- R2 The student is able to solve problems related to the contents of the module.
- R3 The student knows how to use different working techniques in the laboratory and interpret the results.
- R4 The student is able to work at an animal reproduction laboratory correctly performing the basic operations in both the planning and the development of each of the laboratory practices
- R5 The student is able to write a comprehensible and organized text on various aspects of reproduction and obstetrics in the veterinary field.
- 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 reproduction and obstetrics, through teamwork.
- R8 The student argues according to rational criteria based on his or her work.



## 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
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	
CB5	Capacity to develop those learning skills needed to undertake further studies with a high degree of autonomy.				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	
CG3	Understanding and applying control of animal breeding, management, health, reproduction, protection, and feed as well as improving production.			X	
SPECIFIC		Weighting			
		1	2	3	4
E23	Knowing and applying principles and bases of the description and pathogenesis of general alterations of the structure and function of cells, tissues, organs and systems.	X			
E32	Knowing and applying reproduction, birth and postpartum: care and disease.				X



E33 Knowing and applying assisted reproduction.

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

T5 Knowledge of a second language, preferably English, especially technical vocabulary of veterinary science.

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

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

T11 Ability to work in an international context, appreciating diversity and multiculturalism, through the knowledge of foreign cultures and customs.

X



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

Assessed learning outcomes	Granted percentage	Assessment method
R1, R3, R4, R5, R7, R8	25,00%	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, R5, R6, R7, R8	25,00%	Evaluation of practical work in a clinic through which the student must demonstrate the competences acquired and the ability to use them to solve the different situations and problems that arise in a clinic; this assessment may involve one of the following methods, or a combination of several of them: a written individual test, the individual or group performance of a clinical experience, the delivery of an individual or group report on the work carried out in the laboratory.
R1, R2, R3, R4, R5, R6, R7, R8	20,00%	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, R8	30,00%	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

For the final qualification, the results of the different programmed evaluation activities will be weighted. In order to pass the course, it will be necessary to obtain, as a minimum, a qualification equal to or higher than 5.0 points in each of the sections that appear in the evaluation system. If a final grade of 5 points is not obtained in each section and only some of them have been passed, these passed grades will be kept until the second call of the current course, in which students must pass the complete subject. After the publication of the notes, the student will have the timetables published in the platform, to review your examination, unless specifically indicated otherwise by the Professorship. For those students who, for different reasons, do not attend the evaluation of some of the parties on the official date of the convocations, the evaluations will be carried out with an oral examination. Criteria for the granting of Honorary Enrollment: At the discretion of the teacher can be granted a honor roll for every 20 students (not per fraction of 20; except for the first 20 students). -Honorary matriculation can only be granted in the first or second call of the first year of matriculation of the student in the subject. -The teacher may award honorary matriculation to any of the students who have obtained an outstanding performance in the subject.

## 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.
- 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.
- M7 On-site training activity that is defined as the clinical practical work developed in the Veterinary Clinical Hospital or clinical centres ascribed to the University, as well as itinerant clinical practices, mainly with ruminants, equids, pigs, birds and aquatic animals. Also included are necropsies, surgical workshops and training in clinical examination techniques or diagnosis with healthy patients. In these practical sessions the student will always work with animals, which can be healthy (e.g. propaedeutic or obstetrics) or clinical cases (individual or collective), including a protocol or work scheme, being supervised by a teacher and assuming the provision of a service. This type of training corresponds to type e3 of the EAEVE European evaluation called "Clinical Training" (strickly hands-on)". The size of the group will be 5 students or fewer.
- 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.
- 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, R5, R6, R7, R8	50,00	2,00
Seminars (S) M6	R1, R2, R3, R4, R5, R6, R7, R8	6,00	0,24
Problem-solving Practice (PSP) M3	R1, R2, R3, R4, R5, R6, R7, R8	5,00	0,20
Laboratory Practice (LP) M6	R1, R3, R4, R7, R8	35,00	1,40
Clinical Practice (CP) M7	R1, R2, R4, R5, R6, R7, R8	35,00	1,40
Tutorial M8	R1, R2, R3, R4, R5, R6, R7, R8	2,00	0,08
Evaluation (Ev) M9	R1, R2, R3, R4, R5, R6, R7, R8	2,00	0,08
<b>TOTAL</b>		<b>135,00</b>	<b>5,40</b>

## LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
Group work M2	R1, R2, R3, R4, R5, R6, R7, R8	7,00	0,28
Individual work M11	R1, R2, R3, R4, R5, R6, R7, R8	8,00	0,32
<b>TOTAL</b>		<b>15,00</b>	<b>0,60</b>



## Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block

Contents



## UD1-T1

TOPIC 1. REPRODUCTIVE TECHNOLOGY. Overview. Planning of animal reproduction. Reproductive performance. Control of reproduction. Reproductive indexes.

TOPIC 2. SEMINAL EVALUATION AND CONSERVATION. Bases and procedures. Biochemical and metabolic evaluation. Microbiological control. Sperm pathology. Principles of cryobiology. Cellular damage by freezing. Seminal conservation.

TOPIC 3. ARTIFICIAL INSEMINATION. Concept and importance. Semen collection and evaluation. Classic techniques of seminal evaluation: basis and procedures of macroscopic and microscopic techniques.

PHARMACOLOGY AND CONTROL OF CANINE, FELINE, BOVINE, EQUINE, SWINE, RABBITS AND EXOTIC ANIMALS REPRODUCTION. Overview and advantages of their use. Management methods. Oestrus induction and synchronization. Induction of estrus in anestrus and postpartum ovarian activity. Ovulation control. Folliculogenesis-stimulating and ovulation-inducing hormones. Ovulation induction in prepubertal animals. Multiovulation.

SUBJECT 5. ASSISTANCE TO CANINE, FELINE CANINE, FELINE, BOVINE, EQUINE, SWINE, RABBITS AND EXOTIC ANIMALS REPRODUCTION. Importance. Reproductive ultrasound in female and male. Ultrasound of ovaries, uterus, testes and associated glands.

TOPIC 6. EMBRYO TRANSFER. Concept and historical evolution. Preparation of donor and recipient females. Embryo collection technologies. Embryo contrasting. Embryo implantation in recipient females. Embryo transplantation applications. Embryo sexing.

TOPIC 7. IN VITRO FERTILIZATION. Indications. In vitro fertilization technology. Oocyte collection and maturation. Seminal preparation. Co-culture. Embryo manipulation. In vitro embryo development. Intracytoplasmic sperm injection (ICSI).

OOCYTE AND EMBRYO CONSERVATION: Components of the freezing medium. Penetrating and non-penetrating cryoprotectants. Preservation methods: Refrigeration, freezing and vitrification. Storage systems. Conservation of endangered species and breeds. In situ and ex situ conservation strategies. Gene banks.



TOPIC 9. GESTATION DIAGNOSIS AND NEW TECHNOLOGIES. Early gestation diagnosis methods. Immunological control of reproduction. Cloning. Seminal sexing. Transgenic animals.

## Organization of the practical activities:

	Content	Place	Hours
PR1.	Reproduction planning.	Lecture room	4,00
PR2.	Semen collection, evaluation and preservation.	Farm	8,00
PR3.	Reproductive Pharmacology: A.I., Superovulation.	Farm	12,00
PR4.	Embryo collection and classification.	Farm	8,00
PR5.	In vitro fertilization	Laboratory	10,00
PR6.	Oocyte and embryo preservation.	Laboratory	4,00
PR7.	Pregnancy diagnosis.	Farm	8,00

## Temporary organization of learning:

Block of content	Number of sessions	Hours
UD1-T1	67,50	135,00



## References

1. England, G., Heimendahl, A.V. BSAVA. 2010. Manual of Canine and Feline Reproduction and Neonatology. British Small Animal Veterinary Association; 2nd revised edition.
2. Gary England, 2005. Fertility and Obstetrics in the Horse. 3ª edición. Editorial Blackwell Publishing.
3. Gustavo A. Palma. 2009. Biotecnología de la reproducción. Ed. Agro-Veterinaria.
4. Jackson, 2004. Handbook of Veterinary Obstetrics. 2nd edition. Editorial Saunders.
5. Margaret Root Kustritz, 2012. Reproducción clínica de caninos y felinos. Ed. Inter-Médica.
6. McKinnon, Squires, Vaala y Varner, 2011. Equine Reproduction, 2nd Edition. Wiley-Blackwell.



## 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:

The practices of the course that take place at the Veterinary Farm will be carried out through the Teams platform, using the didactic material considered by the Professor.



## 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: