

**Laboratory Animal Science**

Code: 102657  
ECTS Credits: 6

Degree	Type	Year	Semester
2502445 Veterinary Medicine	OT	5	0

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

**Contact**

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**Use of Languages**

Principal working language: catalan (cat)  
Some groups entirely in English: No  
Some groups entirely in Catalan: No  
Some groups entirely in Spanish: No

**Other comments on languages**

Teaching activities are both in Spanish and Catalan

**Teachers**

Maria Lourdes Abarca Salat  
Francesc Padros Bover  
Sara Traserra Call  
Gloria Costa  
Estefania Contreras Carreton  
Joan Antoni Fernández Blanco  
Sandra Barbosa Perez  
Sergio Berdun Marin

**Prerequisites**

Have completed at least the first 3 courses

**Objectives and Contextualisation**

The main objective of this subject is to give the Veterinary student the knowledge and skills to exercise as Designated Veterinarian and person responsible in situ of animal welfare at facilities for the breeding or use of animals of experimentation in accordance with Royal Decree 53/2013. In addition, this subject will give a broad vision of the characteristics of animals most frequently used in experimentation and of the factors to be taken into account in their breeding obtaining maintenance as in their use in experimental procedures.

Once the subject has been completed, the student will be able to serve as Designated Veterinarian and person responsible in situ for animal welfare in breeding centers or users of experimental animals or to direct

their professional career either to field of Management of an animal facility (breeding and maintenance) or to carry out experimental tasks in basic research and in the pharmaceutical industry (experimental models, refinement). An issue that will be dealt with throughout the subject is the importance of the principle of the three R (replacement, reduction and refinement) in the use of animals for experimentation, which is ethically essential as required to comply with current legislation as well as to obtain valid results in research.

Due to the practical nature of the subject, an important part of the classroom hours will be devoted to practices with laboratory animals, where handling and most frequently administration routes in each of the species will be practiced.

The Department of Natural Environment and Biodiversity has recognized the subject for the accreditation of the functions of Designated Veterinarian and as adviser in situ of animal welfare. Likewise, the Department of Natural Environment and Biodiversity recognizes the educational content of this subject for the functions of taking care of animals, euthanasia and for carrying out procedures in any species of veterinary interest and rodents, when they are accompanied by the corresponding certificate of work under supervision. In any case, for the recognition of all these functions, it is necessary to apply for the training to the corresponding Competent Authority.

In addition, the subject has been accredited by the Federation of European Laboratory Animal Science Associations (FELASA). To be able to demonstrate this accreditation with European recognition, you must request a specific certificate through the Academic Management of the Faculty and pay the corresponding fees.

## **Competences**

- Analyse, synthesise and resolve problems and make decisions.
- Demonstrate generic knowledge of animals, their behaviour and the bases of their identification.
- Demonstrate knowledge and understanding of standards and laws in the veterinary field and regulations on animals and their trade.
- Demonstrate knowledge and understanding of structural and functional disorders of the animal organism.
- Demonstrate knowledge and understanding of the aspects of organisation, finance and management in all fields of the veterinary profession.
- Demonstrate knowledge and understanding of the general bases of medical and surgical treatments.
- Draft and present satisfactory professional reports, always maintaining the required confidentiality.
- Recognise ethical obligations in the exercise of responsibilities in terms of the profession and society.
- Recognise when euthanasia is necessary and perform it humanely by employing the appropriate method.
- Treat and handle animals in a safe and humanitarian manner, and instruct other people to properly employ these techniques.

## **Learning Outcomes**

1. Adequately manipulate laboratory animals during experimental procedures.
2. Analyse, synthesise and resolve problems and make decisions.
3. Choose administration methods depending on the experimental procedure.
4. Define the bases of the genetic characterisation of the main mouse and rat traps.
5. Describe applicable legislation on the utilisation of laboratory animals.
6. Describe the biological characteristics of the different species that are most frequently used in experimentation.
7. Distinguish the factors that influence the welfare of laboratory animals, both during maintenance and during use in experimental procedures.
8. Distinguish the scales of animal welfare to evaluate pain.
9. Draft and present satisfactory professional reports, always maintaining the required confidentiality.
10. Enumerate techniques for cloning experimental animals.
11. Explain applicable legislation on safety in the laboratory.

12. Explain the molecular and physiological bases of the pathologies of greatest interest in experimental animals.
13. Identify the functions of the Ethical Committee in animal experimentation.
14. Identify the methodologies for obtaining transgenic animals.
15. Identify the sources of drugs and biopharmaceuticals.
16. Morphologically characterise genetically modified mice.
17. Recognise personal limitations and know when to ask for professional advice and help.
18. Use refinement in experimental surgery performed in a conventional laboratory.
19. Use suitable euthanasia methods in the different species that are most used in experimentation into animal welfare, animal health and public health.
20. Use the most adequate anaesthetics and analgesics depending on the species of experimental animal.

## Content

### THEORY PROGRAM

1. Introduction to Laboratory Animal Science and legislation. Need for the use of laboratory animals and general data referring to their use (species, type of procedures). Legislation in force on the use of laboratory animals in the European Union, in Spain and in the autonomous community of Catalonia. Characteristics of personnel involved in the maintenance and use of laboratory animals.
2. Ethics, well-being and 3Rs. Alternatives to the use of laboratory animals: in vitro methods and cell cultures. Search methods for alternatives in web pages. Election of the alternative method to use.
3. Biology of the most widely used species in research. Biological characteristics of the different species used most frequently used in experimentation and the implications when choosing the appropriate experimental model. Characteristics of mammalian species: mouse, rat, rabbit, pig. Characteristics of non-mammal species: birds and aquatic species.
4. Nomenclature and genetic characterization of laboratory animals. Main strains of mouse and rat. Conventional and genetically modified animals. Nomenclature. Basis of genetic characterization and its importance in research. Genetic monitoring.
5. Microbiological definition of experimental animals and their impact on experimentation.
6. Care and handling of experimental animals: Installations. Control of environmental variables. Concept of barrier: main elements. Levels of containment and biosecurity. Environmental enrichment. Nutrition of animals. Identification of animals. Transportation of experimental animals.
7. Microbiological characterization and health control in experimental animals. Verification of the health status of the laboratory animal: health control. Most common diseases in laboratory animals.
8. Anesthesia, analgesia, surgery and post-surgical care. Anesthetics and analgesics used depending on the species: doses, routes of administration and choice based on the experimental procedure. Control and handling of drugs. Monitoring of variables during surgery. Importance of post-surgical analgesia: assessment of the condition of the animal after surgery.
9. Animal welfare and factors that influence the experimentation. Well-being of the laboratory animal during its maintenance as well as its use in experimental procedures: scales of animal welfare assessment. Verification of the health status of the laboratory animal: protocols for the supervision of clinical signs and corrective measures. Endpoint criteria and methods of euthanasia in different species. Function of the veterinarian in the supervision of animal welfare.
10. Health and Safety at work with laboratory animals. Risks involved in the field of housing and control programs. Legislation in force. Preventive measures. Disposal of waste.
11. Committee of ethics of animal experimentation. Ethical evaluation of procedures. Damage / benefit analysis. Functions of the designated veterinarian, responsible for animal welfare in situ. Members of the Committee for Ethics in Animal Experimentation (CEEAA) and functions. Points to consider in the evaluation of the procedures. Relationship with the Committee for Ethics in Animal and Human Experiments (CEEAH).
12. Principles of good communication of the role of veterinarian in an installation of animals for experimentation. Strategies for good communication and how good communication favors animal welfare. Search for information in the field of laboratory animal sciences.

### PROGRAM OF SEMINARS

1. Nomenclature of experimental animals.
2. Experimental models.

3. Outbreak in an installation for rodents.
4. Anesthesia and analgesia in experimental procedures.
5. Ethical evaluation of procedures, severity, retrospective assessment.

#### PROGRAM OF PRACTICES

1. Legislation (classroom practice).
2. Practices with a mouse. Handling, immobilisation, identification, administration and sampling. Euthanasia
3. Practices with rat. Handling, immobilisation, identification, administration and sampling.
4. Practices with fish. Handling, immobilisation, identification, administration and sampling. Anesthesia in fish
5. Anesthesia and analgesia in rodents. Refinement in experimental surgery carried out in a conventional laboratory. Control of environmental conditions.
6. Evaluation of pain in rodents (classroom practice).

### Methodology

There will be 29 theoretical sessions with practical examples. In these sessions the theoretical concepts that will be applied later in practical case studies.

There will be 2 classroom practical sessions and 4 laboratory practical sessions.

There will be 5 seminars where the topics of the subject will be discussed in a practical way. In some of this seminars students will present their work.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

### Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classroom session in small group	7.5	0.3	2, 16, 4, 5, 6, 7, 8, 3, 11, 12, 15, 13, 14, 17, 9, 20, 19
Laboratory practical sessions	11	0.44	2, 7, 8, 3, 1, 17, 18, 20, 19
Lectures	29	1.16	16, 4, 5, 6, 7, 8, 10, 11, 12, 15, 13, 14, 17, 20, 19
Practical session in big group	3.5	0.14	2, 8, 3, 13, 20
Type: Supervised			
individual session with tutor	8	0.32	2, 16, 4, 5, 6, 7, 8, 10, 3, 11, 12, 15, 13, 14, 1, 17, 9, 18, 20, 19
Type: Autonomous			
Home work and self study	89	3.56	2, 16, 4, 5, 6, 7, 8, 10, 3, 11, 12, 15, 13, 14, 17, 9, 20, 19

### Assessment

The evaluation will be carried out by means of the evaluation of the skills at the practical sessions, the case studies and an examination at the end of the subject.

The minimum classroom attendance necessary to pass the subject is 20 theoretical classes and 4 of the 5 seminars.

The attendance to the practical sessions is obligatory and the performance of the different procedures as well as the attitude will be evaluated. Weight of the practical sessions in the final mark 20%. A positive mark in the assessment of the practical skills in an obligatory condition for passing the course.

There will be 4 practical case studies. The cases will be presented and discussed in a group. Rating: each case 10%. The presentation and the discussion will serve to modulate the mark obtained in the written case. Each case will only count for the mean of the evaluation if you get a minimum score of 5.

Exam: It will consist of a MCQ and short test questions to assess the basic knowledge of the subject. The exam will count 40% of the final mark. Only a score of 4 or more can be compensated for the final mark.

The final grade is obtained by adding the weighted notes of each case and the exam, and the approved one is placed on the 5th.

Reseating:

1. A new evaluation of the practical skills that have not been achieved.
2. Each case in which the mark obtained has been less than 5 must be redone.
3. The exam if a mark of less than 5 grade and not compensated.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Case studies	10% each, total 40%	0	0	2, 16, 4, 5, 6, 7, 8, 10, 3, 11, 12, 15, 13, 14, 17, 9, 20, 19
Exam	40%	2	0.08	2, 16, 4, 5, 6, 7, 8, 10, 3, 11, 12, 15, 13, 14, 1, 17, 18, 20, 19
Practical sessions	20%	0	0	2, 7, 8, 3, 11, 15, 1, 17, 18, 20, 19

## Bibliography

Zuñiga et al. 2008 Ciencia y Tecnología del Animal de Laboratorio. SECAL/UAH.

Laboratory Animals <http://lan.sagepub.com/>

Publications of the American Association for Laboratory Animal Science <http://www.aalas.org/publications/>

Lab Animal Magazine <http://www.labanimal.com/labanimal/index.html>

Nacional Centre for 3 Rs <http://www.nc3rs.org.uk/category.asp?catID=3>

## Software

No special requirements