**Module:**

**Genetics of Laboratory Animals and Experimental Models**

This module provides the practical and theoretical knowledge and skills regarding genetics and experimental models required by designated veterinarians and other onsite personnel responsible for the welfare and care of laboratory animals in the conduct of experimental procedures.

The module consists of two parts. The experimental models’ component provides extensive knowledge of different experimental animal models in different research areas. The genetic component explores models of genetically modified animals, their production, maintenance and the implications for their use.

The content of this module also complies with the training requirements set out in European Directive EU63/2010, developed by the Expert Working Group, supported by the European Commission, in respect of the following modules: 3.2) Basic and appropriate biology (practical); 7) Minimally invasive procedures without anaesthesia (theory), 8) Minimally invasive techniques without anaesthesia (skills).

**Syllabus:**

Topic 1.Genetics, genetic control and genetically modified rodents.

1.1. Basic Concepts of the genetics of mammals.

1.2. Genetically defined lines of mice.

1.3 Genetic modification: transgenesis, targeted mutagenesis and genome editing. Tools and applications.

1.4. Genetically defined lines of rats and other rodents used in animal experiments. Spontaneous mutations. International standardized nomenclature of lines and mutations in rodents

1.5. Molecular Biology tools used in genetics of rodents

1.6. Genetic control and genetic contamination. Practical cases.

1.7. Standard nomenclature inbred, outbred congenic and mutant mice and rats

1.8. Standard nomenclature of GM mice

1.9. Rodent embryo manipulation. Collection, culture and transfer. Comparing mice and rats.

1.10. Genetic altered models in fish.

1.11 Management of colonies. Breeding strategies to keep consanguinity and avoid consanguinity. Breeding schemes in genetically altered animals

1.12 Influence of genetic background on phenotype, examples in neurobiology

1.13 Epigenetics, concept and impact on genotype and phenotype

1.14 Rederivation

1.15 The 3Rs in GA models. How to use international resources

1.16 Production and Management of GA colonies for Phenotyping Platforms

1.17 Rodent basic phenotyping

1.18 Phenotypes by image

1.19 Phenotypes by behaviour

1.20 Reproductive biotechnology. Cryopreservation. FIV

1.21 From founder to line: Establishing a Genetically Altered (GA) line for research purposes

1.22 Establishing a new genetically altered line according to Directive 2010/63/EU. Practical issues.

1.23 Rat husbandry differences in relation to mice

1.24. Practical sessions:

1.24.1. Genotyping procedures

1.24.2. Abdominal and scrotal vasectomy

1.24.3. Obtaining sperm and FIV

1.24.4. Cryopreservation 2 cell and morulae

1.24.5. Collection and Transfer of mouse1-cell embryos

1.24.6. Phenotyping behaviour

Topic 2. Selection of animal model according to biological characteristics

2.1. Biology, management and care guidelines in cephalopods

2.2 Nutrition and its influence on research

2.3 Practical sessions on management, sexing, marking, administration and taking samples in the main species of experimental animals:

2.3.1 Mice and rat

2.3.2 Rabbits

2.3.3 Pigs

2.3.4 Ruminants

2.3.5 Birds

2.3.6 Fish

2.3.7 Amphibians

2.3.8 Cephalopods

2.3.9 Dogs (demonstration)

2.3.10 Nonhuman primates (demonstration)

Topic 3 Selection of experimental model according to type of research.

3.1. Introduction to animal models

3.2 Experimental models in neurodegenerative and rare diseases

3.3 Experimental models in cardiovascular diseases

3.4. Experimental models in oncology.

3.5 Experimental models in diabetes and metabolic diseases.

3.6 Experimental models in Reproduction

3.7 Experimental models in foetal medicine

3.8 Experimental models in immunology.

3.9 Experimental models in infectious diseases.

**Duration of course:** 15 ECTS, 88 attendance hours

**Course dates:** 15 February -15 May 2026

**Attendance dates at UAB:** two weeks to be determined.