

**Laboratory V**

Code: 101943  
 ECTS Credits: 3

Degree	Type	Year	Semester
2500890 Genetics	OB	3	1

**Contact**

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**Use of languages**

Principal working language: catalan (cat)

Some groups entirely in English: No

Some groups entirely in Catalan: Yes

Some groups entirely in Spanish: No

**Prerequisites**

- It is mandatory to have taken -o being currently taking- the theoretical subjects related to the experimental work developed here.
- Biosecurity and security tests at 'campus virtual' need to be passed. The student must prove knowledge and acceptance of the Bioscience laboratory guidelines.
- It is necessary to go through the theoretical content of each module before the day of the practical classes.
- Wearing a lab coat is mandatory. It is not possible to enter to the lab without a lab coat.
- Attendance is mandatory.
- Students should come to the class following the assigned schedule. Changes in the original schedule need to be approved by the corresponding professor and in all cases before the starting of the classes.

**Objectives and Contextualisation**

The Integrated Laboratory V is the fifth course in a set of 6 which are distributed along 6 semesters of the first three courses of the degree of genetics. These subjects aim to give a solid foundation of experimental procedures, techniques and skills of genetics and related sciences. The practical work help to reinforce the theoretical concepts acquired in the theory, and allow us to understand the essential dialogue between theory and experimentation that have given rise to the body of knowledge that constitutes the science of genetics.

The Integrated Laboratory V has as objectives the acquisition of experimental skills in 3 specific modules of content:

- Genomics
- Human Genetics
- Quantitative genetics and improvement

**Genomics**

The main objective of Genomics module is to understand the process of Assembly, annotation and analysis of genomic sequences. Apart from learning to work with DNA sequences and proteins also will acquire knowledge about the structure and the characteristics of the various functional elements that can be found in a genome.

**Human Genetics**

The aim of the module of human genetics is to know how to identify genetic mutations and polymorphisms related to the generation of diversity and the pathological processes. Through these practices, the student will acquire skills in the application of instrumental, molecular and analytical techniques.

### **Quantitative genetics and improvement**

The aim of this module is to help you understand the principles of Quantitative genetics and its application in the selection, as well as the availability of tools for the identification of individual genes that determine the complex characters.

## **Content**

### **Module of Genomics**

The module is organized in 5 sessions of 3 hours each that will take place in the computer room. The work will consist of the Assembly, the annotation and analysis of a sequence. Based on initial data, the practice will be continuing along the 5 sessions so that each of them will be one more step in the process or will examine a different aspect of the sequence. The work will be distributed in the following way:

Session 1. Assembly

Session 2. Scaffolding

Session 3. gene annotation Ab initio and by homology

Session 4. Annotation of genes with RNA-seq

Session 5. Functional analysis and discussion

### **Module of Human Genetics**

The module is organized in 4 sessions of 4 hours each that will be carried out in the laboratory. The students will go through three possible cases occurring in a genetics laboratory: case of prenatal diagnosis, case of leukemia, population screening for a mutation with possible applications (e.g. in the pharmacogenetics or Nutrigenetics). To respond to these three situations several techniques will be used, such as conventional cytogenetics, fluorescence in situ hybridization (FISH), polymerase chain reaction (PCR) and restriction fragment length polymorphisms (RFLPs).

### **Module of Quantitative genetics and improvement**

GQM module is organized in 6 sessions that will take place in the computer room. The sessions will be synchronic with the theory classes (see calendar), so that the student may work and reflect the essential concepts and methodologies of the topic. The sessions are the following:

Session 1. Analysis of the genetic components of quantitative characters (2 h).

Session 2. Analysis of Association (Genome-wide association studies), and (3).

Session 3. Analysis of Association (Genome-wide association studies), II (2 h).

Session 4. Genetic assessment: animal model BLUP (2 h).

Session 5. The optimization selection and effects of selection on the genetic structure of populations (3 h).

Session 6. Simulation of the selection in the cow (3 h).