Universitat Autònoma de Barcelona

2017/2018

Laboratory IV

Code: 101944
ECTS Credits: 3

Degree	Type	Year	Semester
2500890 Genetics	OB	2	2

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: Yes

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 IV is the fourth 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 IV has as objectives the acquisition of experimental skills in 4 specific modules of content:

- Population Gernetics
- Mutagenesis
- Databases and basic programming in Pearl
- Developmental Biology
- Scientific documentation

OBJECTIVES

Module of Population genetics

Two are the main objectives of this module: (1) understanding the factors that modulate the genetic variation in the populations and (2) learn how to describe the nucleotide variation of a gene. For the first objective the

POPULUS 5.4 software package will be used, which allows to simulate different population processes and provides a graphical representation of the results. For the second, students will employ the Polymorphism Diversity Analysis Software (PDA) developed by researchers at the Genetics Unit.

Module of Mutagenesis

The fundamental objectives of the specific module of Mutagenesis are:

To conduct a small pilot study of biomonitoring in a human population by determining the induction and the origin of the micronuclei observed in cells of the oral mucosa. To find out their possible association with gene polymorphisms of glutathione-S transferases.

To follow the appropriate protocols and experimental methods needed to conduct the experimental part of the above-mentioned study.

To perform the statistical analysis of the obtained results using the SPSS program.

Module of Databases and basic programming in Perl

The current scenario of research in the genetic field requires that the researcher know and use computer tools. How genetic information is stored in databases? How can you extract this information flexibly? How to create programs to manipulate and analyze genetic data?

The objectives of the module are to create programs and use database management systems that are currently being used in the genetic field.

• Learn to program with the Perl language

• manage and consult databases

• apply this instrumental capacity to the processing of genetic data

• to promote the connection between the computer tools and the genetic data, a key aspect of the bioinformatics research.

Module of Developmental Biology

• To visualize in 4 d basic developmental processes.

Module of Scientific Documentation

This module aims to provide a general theoretical and practical basis to deep into the use of information resources specialized in genetics and related disciplines. The specific objectives of the module are:

• Learn how to solve information needs in the field of genetics and related sciences through the use of bibliographic resources.

• Know how to propose strategies for the search and retrieval of information on electronic sources.

Content

Module of Population Genetics

The Population genetics module is organized in 5 sessions of 2.5 hours each and they will be held in the computer room.

Practice 1-3. Simulations by computer with the program POPULUS. Study of the interaction of the main forces that modulate the evolution.

- Session 1. Selection and drift.

- Session 2. Selection and mutation.
- Session 3. Population structure: selection and migration.

Practice 4. Molecular genetics of populations. Analysis of the nucleotide in the G6pd gene diversity

Module of databases and basic programming in Pearl

The module is organized in 4 sessions of 2 hours each and will take place in the computer room.

• session 1: databases: management and genetic data queries with MySQL databases

• session 2: programming in Perl. Basic operations in Perl

• session 3: programming in Perl. Flow control and regular expressions

• session 4: Perl and databases. Modules and subroutines.

- Session 4. Interspecific variability.
- Session 5. Intra-specific variability.

Module of Mutagenesis

Scheduled practices in these sessions will allow the student to learn the basic techniques of:

• Practice 1: preparation of miconuclei in buccal mucosa cells

• Practice 2: DNA extraction

• Practice 3: preparation and staining observation of micronuclei

• Practice 4: Electrophoresis gels and REAL-TIME PCR

• Practice 5: Completion of questionnaires, annotation of the data and statistical analysis of the results.

Module of Developmental Biology

1) Visualization in 4 d (space + time) of the patterns of gene expression at the level of mRNA and protein for the main transcription factors, growth factors, receptors and signal transduction factos in the development of Drosophila, mouse, and Xenopus. Familiarization with the databases of gene expression.

2) comparative study of movements in 4 d (space + time), on the basis of videos in real time from databases of free access, of the movements of blastulation and gastrulation in the main groups of metazoans.

3) exploration of the relative importance and dynamics, using existing simulation software, of the different morphogenetic processes in a paradigmatic process in the animal development: the trachea

Module of Scientific Documentation

The module of scientific documentation is divided in 2 sessions of 2 hours each, to be held in computerized classrooms. The contents of each session will be:

1. Bibliographic resources specialized in technical and scientific information: publishing Portals (SCOPUS, Science Direct); Web of Science. Databases in the field of medical distributor (ProQuest).

2. Bibliographic resources provided by the National Library of Medicine: Medline, Pubmed, GenBank, OMIM. Access to information about patents: Latipat and Espacenet.