ADVANCED GENETICS (2015-16)

GENERAL INFORMATION

Code 26535

ECTS Credits 6

Departments and areas

Department	Area	Area	Report R.
PHYSIOLOGY, GENETICS AND MICROBIOLOGY	GENETICS	YES	YES

Studies

DEGREE IN BIOLOGY

Context of subject

Extension of Genetics further explore the molecular basis of inheritance, variation and regulation of gene expression (previously acquired in Genetics, first course) by studying gene structure and function at the molecular level. Therefore, involves the so-called Molecular Genetics area.
The study of molecular structure of genomes reveals a surprising diversity between organisms, launching a debate on the role for DNA sequences arrangement in phenotype or even in their evolution. Studying transcription and translation mechanisms at the molecular level allows identification of relevant factors (sequences, proteins and other molecules) involved in those processes and unravels the diverse mechanisms for gene expression regulation that modify in quantity and/or activity gene products in response to environmental changes or different stages of cell/organism cycle.
At the professional level, Molecular Genetics is crucial in areas such molecular diagnosis, clinical laboratory, human reproduction or gene therapy, as well as in biotechnological applications for improvement of animal, plants and industrial production.
This subject is supported by the previous knowledge acquired by the student in the subjects of Genetics and Biochemistry in the first year, and Microbiology in the second year, and it is complemented by Molecular Techniques, also in the third year, mainly in the description of techniques for isolation, manipulation and analysis of nucleic acids. Those relationships are also important for the Applied Genetics subject in fourth year, where knowledge acquired in Extension Genetics is the basis for understand Molecular Genetics medical and industrial applications.

OBJECTIVES

Subject objectives/competences (2015-16)

Subject objectives/competences

- To understand structure and function of DNA and other biomolecules in biological processes
- To understand the basis of the expression of genetic information and its regulation
- To learn to interpret chromosome maps and its applications
- To apply the scientific method in the context of Genetics

Specific Objectives

- To develop the ability to solve Molecular Genetics problems
- To acquire practical skills in the methodology of the subject
- To develop skills related to scientific criticism and scientific method in general
- To know and assess the social scope of some aspects of research in Molecular Genetics
- To learn the specific techniques for analysis of gene expression and regulation and develop abilities concerning experimental design, analysis and evaluation of the information obtained from genetic experiments
- To learn the correct use of usual instruments and techniques in a Molecular Genetics laboratory
- To develop general skills, such oral communication, public speaking and discussion

CONTENTS

Theoretical and practical contents (2015-16)

Theoretical contents
1. Genome content and organization. (2 h.)
2. Mapping genomes. (1 h.)
3. Studying DNA function. (3 h.)
4. Gene expression: relevant elements and interactions in transcription and translation. (6 h.)
5. Prokaryotic regulation of gene expression. (8 h.)
6. Eukaryotic regulation of gene expression. (5 h.)
7. Genetic control of development. (2 h.)
8. Genetics and cancer. (1 h.)

Practical contents
- Lab practices. Use of reporter genes in the study of gene expression and protein-protein interactions.
- Computer practice. Use of online tools in the analysis of DNA and protein sequences.
- Problems discussion practices. Students will discuss the solution to representative problems related to topics addressed in theoretical lectures.
- Group tutorials. These sessions will be used to recap, extend and consolidate concepts addressed in theoretical lectures.

EVALUATION

Instruments and criteria of Evaluation 2015-16

Evaluation:

- 2 Individual Problems: 20 (10+10) points.
- 2 Individual Test: 10 (5+5) points.
- Group Problems 10 points.
- Extra individual points: up to 10, require very active participation and volunteering to discuss problems

All tests would be with 4 alternative answers,1/3 points penalty for wrong answers. To pass the course, a minimum of **20 points** including **12 points** from the Exams is required. To obtain the final score, the total number of points would be divided by 4.

Plan B: If you obtain more points from any of the "Exam Problems" than from "Group problems", then your best "Exam Problem" score will appear also in your "group problems" column.

July/December Extraordinary exam: 10 questions (problem-like tests). You can pass the course with **5**, or just **4** points/10 if you previously accumulated a minimum of 20 points.

Type	Criterion	Description	Ponderation
FINAL TEST	Up to 30 points for exams: Two problems 20 points (10 + 10 points) Two test 10 points (5 +5 points) All tests would be with 4 alternative answers, 1/3 points penalty for wrong answers.	Problems and test exams	50
ACTIVITIES OF EVALUATION DURING THE SEMESTER	Group Problems **10 points**. Extra individual points: **up to 10**, require very active participation and volunteering to discuss problems.	Problems and Extra points	50