SYLLABUS

1. COURSE DESCRIPTION

Degree:	**Biotechnology**
Course:	**Genetics**
Module:	**Foundations of Biology, Microbiology and Genetics**
Department:	**Molecular Biology and Biochemical Engineering**
Academic Year:	**2017-18**
Term:	**Second**
ECTS credits:	**6**
Year:	**1st year**
Type:	**Compulsory**
Language:	**Spanish**

Course Model:	**B1**	
a. Basic learning (EB):	**60 %**	
b. Practical learning (EPD):	**40 %**	

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2. LECTURERS

2.1. Coordinator

2.2. Lecturers	
Name:	**Juan Jiménez Martínez**
School:	**School of Experimental Sciences**
Department:	**Molecular Biology and Biochemical Engineering**
Area:	**Genetics**
Office Hours:	**Wednesdays and Thursdays: 18.00-21.00 (only by previous contact through e-mail)**
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Name:	**Silvia Salas Pino**
School:	**School of Experimental Sciences**
Department:	**Molecular Biology and Biochemical Engineering**
Area:	**Genetics**
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3. TOPICS

INTRODUCTION

Introductory Chapter 0. - From Mendel to Genomic

I. THE GENOME
Chapter 1. Genetic information.
a) Structure of the Nucleic Acids.
b) Genome structure and organization
Chapter 2. The duplication of the genetic material
a) DNA Replication
b) Replication as a scientific and biotechnological tool

II CHANGES IN THE GENETIC INFORMATION
Chapter 3. Alterations of DNA
a) Spontaneous and induced mutations
b) Mechanisms of DNA repair

III ROLES OF THE GENETIC MATERIAL.
Chapter 4. From genes to proteins
a) Transcription
b) Translation. Structure and function of proteins
Chapter 5. Control of gene activity
a) Genetic control elements
b) Epigenetics
Chapter 6. Phenotypic effect of mutations
a) Functional consequences of the mutation
b) Reversion of mutations

IV GENETIC ANALYSIS
Chapter 7. The inheritance of diversity
a) Life Cycles: Mitosis-Meiosis
b) Errors in meiosis: numerical alterations in the karyotype
Chapter 8. Genetic analysis in haploid
a) Analysis of complementation
b) Linkage analysis and recombination
Chapter 9. Genetic analysis in diploid
a) Mendelian segregation
b) Interdependence between genes
c) Exceptions to Mendelian segregation

V. POPULATION GENETICS AND DEVELOPMENT
Chapter 10. The genes in evolution
a) - Population genetics
b) - Molecular Evolution

EXPERIMENTAL CLASSES (PRACTICES).
The practices program has two series, the first one with 2 main sessions (3 hours / session) and the second practice series with 4 sessions.

Serie 1 of Practices. Replication as a tool in Biotechnology
1. Objectives of the Practice.
In this practice we see the replication machinery as a tool in biotechnology. We deal with two techniques that revolutionized molecular sciences, techniques that become today's essential tools in any laboratory of Molecular Biology: the Polymerase Chain
Reaction (PCR) and DNA sequencing. In both cases we see the theoretical basis and the necessary equipment, and carry out the experimental analysis of two major variants in a human gene as an application of the PCR technique.
2. Topics of the Practice.
2.1. Two techniques, two Nobel laureates
2.2 PCR and DNA sequencing. Molecular basis.
2.3. Types and Applications
2.4 Separation and visualization of nucleic acids

Serie 2 of Practices. Genetic Analysis in haploids
1. Objectives of the Practice.
Historically, genetics began using whole organisms without any knowledge of the molecular basis of genes. In fact, Mendel formulated his laws without knowing the nature of the gene. Haploid organisms constitute a fabulous model for genetic analysis.

In this practice we will see the power of Genetics analysis in understanding biological processes, and how this analysis drive to the construction of genetic maps and biochemical routes.
2. Topics of the Practice.
21. Haploid sexual cycle
2.2. Reverse genetics. Analysis of mutants.
2. 3. Complementation analysis. Complementation groups.
2.4. Chromosome theory.
2.5. Linkage. Coupling and Repulsion
2.6. Positional cloning. Genetic maps
2.7. Gene conversion.