Teaching guide

IDENTIFICATION DETAILS

Degree:	Biomedicine
Scope	Biology and Genetics
Faculty/School:	Experimental Sciences
Course:	GENETICS
Type:	Compulsory
ECTS credits:	4
Year:	1
Code:	2134
Teaching period:	Second semester
Subject:	Genetics
Module:	Biochemistry and Molecular Biology
Teaching type:	Classroom-based
Language:	Spanish
Total number of student study hours:	100

SUBJECT DESCRIPTION

In the subject of Genetics, we will study the mechanisms of determination, transmission and variation of characters. This study will be carried out in model organisms and in humans, as well as at the individual and population levels.

Genetics is a fundamental pillar for 21st century medicine. From its inception to the present day, the powerful integration of classical and molecular approaches has brought it to a position of prominence in current biology and medicine. Biomedicine has as its essential engine of development the advances generated by Genetics through the various fields covered by its study, molecular biology, recombinant DNA technology and the analysis of complete genomes or Genomics. This progress is reflected in new diagnostic procedures, greater accuracy in the prognosis of many diseases and the development of new therapies, with the aim of tending towards more personalized and, therefore, more effective treatments.

The Human Genome, 10000GENOMES and ENCODE projects have provided essential information on many diseases, but they have also highlighted the importance of knowing the variability of individual genomes in highly prevalent diseases such as cancer or cardiovascular diseases.

Therefore, in order to play an active role in the progress of Biomedicine, it is essential, during the Degree, to immerse oneself in the knowledge of the nature, organization, expression, transmission and variation of genetic material and the characters it determines, at the individual and population levels. In short, in the field of study of Genetics.

In the Biomedicine Degree at UFV, the subject of Genetics belongs to the Biochemistry and Molecular Biology module. It has an endowment of 4 ECTS credits that translate into 100 hours of student work. The weight of the subject will fall on genetic analysis both in model organisms and in humans, and on cytogenetics. The student will work on these contents through the search for information, analysis and drawing conclusions and solving problems and issues. The teacher will primarily serve as a guide or tutor for these activities.

GOAL

The objective of the course is for the student to acquire a solid understanding of the bases and mechanisms of inheritance and of the method of genetic analysis.

The specific aims of the subject are:

Know the nature, location and organization of hereditary material.

Understand the cellular processes that contribute to the transmission and expression of genetic information.

Understand the basics, the necessary methodology and the usefulness of constructing genetic maps.

Understand the molecular basis of genetic variation between individuals.

Apply this knowledge to the interpretation and resolution of genetic problems.

PRIOR KNOWLEDGE

It is advisable for the student who accesses the subject to review the basic processes of cell division in the subject of Cell Biology, as well as the contents on the structure and organization of nucleic acids in the subject of Biochemistry.

COURSE SYLLABUS

I. INTRODUCTION
TOPIC 1. Introduction.
II. GENETIC ANALYSIS
TOPIC 2. Mendelian principles of inheritance.
TOPIC 3. Gene interactions.

TOPIC 4. Ligation and recombination.
TOPIC 5. Non-Mendelian inheritance.
II. GENOMES
TOPIC 6 Structure, properties and organization of genetic material.
TOPIC 7. Organization of genetic material.
TOPIC 8. Replication of genetic material. PCR.
TOPIC 9. Expression of genetic material.
IV. GENETIC VARIABILITY
TOPIC 10. Eukaryotic genome.
TOPIC 11. Gene mutations.
TOPIC 12. Chromosome mutations.

EDUCATION ACTIVITIES

Expository classes: They will consist of master classes given by the teacher in which the contents of the subject are presented. These classes will be supported by computer presentations that will be available to the student through the subject's website. In each academic year, one or two relevant researchers from fields related to the subject may be invited to give a master class related to their research.
Seminars (exercises and practical cases): At the end of the topics, students will be asked to solve different tasks related to the contents studied in that topic (solving questions, carrying out tests, solving practical cases, analyzing articles or scientific news, etc...). The teacher will tutor this work through ordinary teaching sessions and individual or group tutoring.
Tutoring: Through tutoring, the teacher, at the request of the student and at the established time for this purpose, will answer questions, or discuss the questions posed to him by the student, in order to guide him in learning the subject.
The teachers of the subject do not authorize the publication by the student of the material provided by the teachers of the subject in the virtual classroom, or by any other means.

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
40 Horas	60 Horas

LEARNING RESULTS

Know the basic morphological, metabolic, physiological and genetic characteristics of both prokaryotic and eukaryotic living organisms, taking into account their morphological and functional unit.

Determine inheritance patterns through pedigree genetic analysis.

Identify the main components of the organization of a gene and of the human genome, including the elements that control gene expression.

SPECIFIC LEARNING RESULTS

Know the nature of hereditary material and its organization in chromosomes and genomes

Know the processes of replication, transcription and translation.

Explain and interpret Mendel's experiments and understand how they establish the mechanisms of inheritance.

Understand and apply genetic analysis methods to the study of gene transmission and function.

Determine the genetic basis of a character based on inheritance patterns.

Distinguish the different types of mutations and assess their molecular and phenotypic consequences

LEARNING APPRAISAL SYSTEM

In the continuous evaluation system, each student's learning will be assessed using objective data from:
ORDINARY CALL

Evaluation of the theoretical content of the subject (70%): The main objective of the exam will be to verify that the basic concepts presented in the theoretical classes have been assimilated and understood, as well as the students' reasoning ability to solve questions characteristic of the subject. The exam will consist of test-type questions and/or short questions, and problems (learning outcomes RA1 - RA6 will be evaluated).
Realization and resolution of exercises and practical cases (30%): The resolution of questions, testing, solving practical cases, solving tasks, analyzing articles or scientific news, etc... will be evaluated, at the end of each of the topics (learning results RA4 - RA5 will be evaluated).

EXTRAORDINARY CALL

Evaluation of the theoretical content of the subject (70%): Like the theory exam of the ordinary call, this test will consist of test-type questions and/or short questions, and problems, which allow us to assess the student's acquisition of the competencies included in the teaching guide (learning results RA1 - RA6 will be evaluated).
Carrying out and solving exercises and practical cases (30%): If this part is suspended, an exam will be carried out with questions, analysis of practical cases or analysis of articles or scientific news, depending on the tasks carried out during the course (learning results RA4 - RA5 will be evaluated).

In order to average the different parts, in both calls, it is essential to obtain a score higher than 5 in the theory exam and in the resolution of exercises and practical cases. If any of these parts are suspended in the ordinary call, only these parts will be evaluated in the extraordinary call, since the grade of the approved part will be saved for the extraordinary call (not saved for subsequent enrollment). In the alternative evaluation system, the percentages and evaluation criteria of the regular evaluation system will be maintained.
Plagiarism, as well as the use of illegitimate means in evaluation tests, will be sanctioned in accordance with those established in the Evaluation Regulations and the University's Coexistence Regulations.

ETHICAL AND RESPONSIBLE USE OF ARTIFICIAL INTELLIGENCE

1.- The use of any Artificial Intelligence (AI) system or service shall be determined by the lecturer, and may only be used in the manner and under the conditions indicated by them. In all cases, its use must comply with the following principles:
a) The use of AI systems or services must be accompanied by critical reflection on the part of the student regarding their impact and/or limitations in the development of the assigned task or project.
b) The selection of AI systems or services must be justified, explaining their advantages over other tools or methods of obtaining information. The chosen model and the version of AI used must be described in as much detail as possible.
c) The student must appropriately cite the use of AI systems or services, specifying the parts of the work where they were used and describing the creative process followed. The use of citation formats and usage examples may be consulted on the Library website(https://www.ufv.es/gestion-de-la-informacion_biblioteca/).
d) The results obtained through AI systems or services must always be verified. As the author, the student is responsible for their work and for the legitimacy of the sources used.
2.- In all cases, the use of AI systems or services must always respect the principles of responsible and ethical use upheld by the university, as outlined in the Guide for the Responsible Use of Artificial Intelligence in Studies at UFV. Additionally, the lecturer may request other types of individual commitments from the student when deemed necessary.
3.- Without prejudice to the above, in cases of doubt regarding the ethical and responsible use of any AI system or service, the lecturer may require an oral presentation of any assignment or partial submission. This oral evaluation shall take precedence over any other form of assessment outlined in the Teaching Guide. In this oral defense, the student must demonstrate knowledge of the subject, justify their decisions, and explain the development of their work.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

William S. Klug... [et al.]. Concepts of genetics/12th ed. New York: Pearson, 2018.
(William S. Klug... [et al.]. Concepts of genetics/12th ed. New York: Pearson, 2018. , ||Willian S. Klug... [et al.]. Concepts of genetics [Electronic resource]/12th ed. New York: Pearson, 2019.)

Pierce, Benjamin A. Genetics: a conceptual approach/7th ed. New York: Macmillan Learning, 2020.
(Pierce, Benjamin A. Genetics: a conceptual approach/7th ed. New York: Macmillan Learning, 2020. , ||Anthony J. F. Griffiths... [et al.]. Introduction to genetic analysis/12th ed. New York: Macmillan International, 2020.)

Additional

Tom Strachan, Andrew P. Read. Human molecular genetics/5th ed. Boca Raton (Florida) :CRC, 2019.
(Tom Strachan, Andrew P. Read. Human molecular genetics/5th ed. Boca Raton (Florida) :CRC, 2019. , ||Tom Strachan, Judith Goodship, Patrick Chinnery. Genetics and Genomics in Medicine/New York: Garland Science, 2014.)