

**COURSE DATA****Data Subject**

Code	33136
Name	Genetics and cytogenetics
Cycle	Grade
ECTS Credits	9.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
1109 - Degree in Biochemistry and Biomedical Sciences	Faculty of Biological Sciences	2	Annual

Subject-matter

Degree	Subject-matter	Character
1109 - Degree in Biochemistry and Biomedical Sciences	9 - Genética y biología molecular	Obligatory

Coordination

Name	Department
GARCIA ROBLES, INMACULADA ROSA	194 - Genetics
MARTINEZ SEBASTIAN, MARIA JOSE	194 - Genetics
RAUSELL SEGARRA, CAROLINA	194 - Genetics

SUMMARY

The subject of genetics and cytogenetics is offered in the second year of Bachelor's degree in Biochemistry and biomedical CC (2009 Plan). It is a compulsory subject, together with the genomics, genetics of development, human genetics, technical subjects of genetic analysis and genetic engineering aims to provide the student the basics relating to biological inheritance as well as the conceptual and methodological tools that enable it to carry out, in their professional work, tasks related to genetic analysis and the clinical genetics.

The student studied this subject at the same time to subject structure of macromolecules, methods in biochemistry, biosynthesis of macromolecules, etc., which will complement the skills and basic knowledge related to the foundations of the molecular biology and cell, in particular on the structure of nucleic acids, their replication, transcription and translation, cell cycle, and phenomena of importance



from the genetic perspective such as mitosis and meiosis, the two mechanisms responsible for the transmission of hereditary information.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

OUTCOMES

1101 - Degree in Biochemistry and Biomedical Sciences

- Skills in analysis and synthesis.
- Capacidad de resolución de problemas.
- Capacidad de aprendizaje autónomo.
- Capacidad de comunicación oral y escrita.
- Capacidad de manejar el inglés como lengua extranjera.
- Capacidad de utilizar las nuevas tecnologías de información y comunicación.
- Desarrollo de habilidades para comprender metodología e interpretar resultados científicos.
- Capacidad para el trabajo en equipo y la cooperación.
- Desarrollo de la capacidad de razonar y aplicar el método científico.
- Comprensión de la lógica molecular de los seres vivos como producto de la evolución.
- Capacidad para trabajar en el laboratorio de genética y biología molecular incluyendo seguridad, manipulación, eliminación de residuos y registro anotado de actividades.
- Conocer y comprender las bases moleculares de la información genética y los mecanismos de su transmisión y variación.
- Relacionar las características estructurales y funcionales de las macromoléculas.
- Tener una visión integrada del metabolismo celular y la expresión génica relacionándolas con los distintos compartimentos celulares.
- Tener una visión integrada de las respuestas celulares a los efectores y cambios ambientales.



- Conocer los elementos comunes y los diversos de la genética y la biología molecular de los diferentes tipos de organismos vivos.
- Adquirir conocimientos teóricos sobre la estructura, función y evolución de los genomas.
- Conocer las aplicaciones de los conocimientos en genética y biología molecular en el diagnóstico de enfermedades humanas.

LEARNING OUTCOMES

Acquiring knowledge and understanding of genetic
Solving theoretical and practical exercises
Practical activities in the laboratory and analytical results.
Realization group written work and oral presentation with visual support.

DESCRIPTION OF CONTENTS

1. Theory

Introduction
Patterns of inheritance
Calculation of proportions and hypothesis testing
Quantitative traits
Chromosome Theory of Heredity
Linkage, recombination and mapping
Nucleic acids
The metaphase chromosome
The Karyotype
Structural variations
Numeric Variations

2. Problems

Prediction of offspring
Exceptions
Pedigree analysis
Linkage, recombination and genetic distance
Structural variations
Numerical variations

**3. Practice**

PRACTICE 1. Segregation of Characters. Observation of independent segregation against segregation linked genes. Application of statistical analysis of experimental results. Estimating the distance between linked genes. (8.5 hours)

PRACTICE 2. Polytene chromosomes. Preparation and observation of polytene chromosomes. Detection and study of chromosomal inversions. (6.5 hours)

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	53,00	100
Classroom practices	23,00	100
Laboratory practices	14,00	100
Development of group work	20,00	0
Study and independent work	80,00	0
Readings supplementary material	7,00	0
Preparing lectures	13,00	0
Preparation of practical classes and problem	15,00	0
TOTAL	225,00	

TEACHING METHODOLOGY

The development of the course is divided into:

Class Theory: A total of 42 sessions are needed one hour to cover this facet teacher. They basically used the lecture. The teacher will present the most relevant content for the course, using the media necessary for agile development and consistent application of them. The teacher will available early enough in the platform to support virtual classroom teaching, the material necessary for the proper monitoring of the lectures.

Classes of problems: it held 23 sessions of one hour throughout the course, coordinated with the lectures, usually at the end of each of the sections of the agenda. These sessions reinforce the concepts presented in the theoretical sessions and encourage the active participation of students through discussion and problem solving. The teacher will prepare a series of problems for each topic or subject block that will work individually (through personal preparation thereof) and collectively (through presentation and discussion of them in group class) various aspects with the content of the agenda.

Hands-on labs: They are of compulsory attendance. There will be 7 sessions of 2 hours each. Students should come equipped with a lab coat, safety glasses and mask.

Seminars: This activity will be organized jointly with the other subjects of a second degree course. The activity will involve the preparation and presentation of a seminar, lasting approximately 30 minutes for the students in groups of two and active participation in the discussion of all the seminars. Students will complete the preparation and presentation of the seminar once during the schedule of classes. In "Genetics and Cytogenetics" will be held 5 seminars. Also offer a seminar-conference given by a visiting researcher. The seminar activities will be binding.



In addition, the student is encouraged to use personal tutoring for advice and discuss any topic with the teacher about the program, the subject, or career.

EVALUATION

First Call

The concepts worked in the theoretical sessions, as well as the student's ability to face and solve genetic problems, will be evaluated continuously throughout the course, as far as possible, by carrying out various activities including questionnaires (kahoot or moodle type), designing and solving genetic problems in the classroom, attendance at specific face-to-face or "online" conferences and questionnaires related to them and the completion of two written tests at the end of each semester. The total value of these tests / activities will be 75% of the total.

Laboratory: Attendance is mandatory. The f laboratory sessions and the analysis of results will be evaluated. The value of the laboratory grade will be 15% of the total.

Seminars: The completion of this activity is mandatory. It will assess the capacity for synthesis and integration of information from participating students, the clarity and quality of exposition and defense of the questions made by students and teachers. The value of the seminar grade represents 10% of the total.

The final grade is the sum of the grades achieved in the different sections, as long as the mark for each one of them was greater than 5 out of 10. To pass the course will be necessary to obtain an overall score greater than 5 out of 10, provided that the note of each of the sections is equal to or greater than 5 out of 10.

Second call: The grade obtained in the first or second semester will be saved for the second call, if it is greater than 5 out of 10, unless the student waives this (performing and presenting the corresponding section of the review of the second call). The grade obtained in the laboratory practices and seminars is unique and will be saved for the second call if necessary.

Note from the Department of Genetics, "students are reminded that the waiver is not possible to score on the subject, once published, both in the evaluation of participation in classroom teaching activities (laboratory, problems, seminars, etc. . .) the different tests and evaluation of documents submitted for this assessment (tests, reports, etc..) ".



REFERENCES

Basic

- Nussbaum, R.L.; McInnes, R.R. and Willard, H.F. (2016). Thompson & Thompson Genética en Medicina. 8ª Edición. Ed. Elsevier Masson. ISBN: 9788445826423
- Pascual, L i Silva, F. (2018). Principios básicos de genética. 1ª edició. Ed. Síntesis. ISBN9788491711063
- Pierce, B (2015) Genética: Un enfoque conceptual Panamericana ISBN-10: 8498353920 Problemas Benito, C. 141 Problemas de Genética. (2015). 1ª edició. Ed. Síntesis. ISBN 9788490772195

Additional

- Griffiths y otros (2013) Genética. Ed. McGraw-Hill-Interamericana, ISBN-9788448160913
- Klug y otros (2013). Conceptos de Genética. Pearson Education. ISBN-9788415552499
- Pascual i Moltó. (1999) Però què és això de la Genètica. Ed Univ. de Valencia. ISBN- 8437041570
- Lacadena (1996) Citogenética. Univ. Complutense. ISBN- 848936558X
- Investigación y Ciencia. Diferentes números

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

1) And 2) Contents and volume of work.

No changes (the idea is not to alter the contents due to this situation, nor the volume of work, the methodology changes).

3) Methodology.

The starting point given the number of students and available classrooms is full presence in the activities. However, given the possibility that the evolution of the situation derived from COVID-19 may force a reduction in attendance, the following measures will be taken:

1) The classroom activities would be replaced based on the technological tools available in the classroom at the time of course development, by the following methodologies:

-Synchronous video conference

-Powerpoint presentations with audio presented in Virtual Classroom

-Proposals of activities to solve Virtual Classroom Questionnaires and delivery of tasks and questions by Virtual Classroom



2) The face-to-face laboratory practice activities would be replaced by the following methodologies:

- Simulated laboratory practices by videoconference or videos and animations will be provided to the students in which the realization of the techniques that would initially be planned to be carried out in the laboratory in person is shown
- Powerpoint Presentations with audio in Virtual Classroom
- Work with supplied experimental data
- Practical virtual exercises that simulate laboratory activities

3) For tutoring and questions the following methodologies would be used:

- Synchronous chats in Virtual Classroom
- Asynchronous forums in Virtual Classroom
- Direct teacher-student communication through institutional mail

4) Evaluation.

In case the exams could not be face-to-face, they would be conducted 'online' in the Virtual Classroom using the available tools. The rest of the activities, questionnaires, laboratory memory, attendance to webinar and related questions will be evaluated in the manner provided in the original teaching guide.

The specific details of the adaptation to the situations that may occur will be supervised by the CAT and communicated to the students through the Virtual Classroom