UAB
Universitat Autònoma de Barcelona

Genetics

Code: 100777
ECTS Credits: 6

2024/2025

Degree	Type	Year
2500250 Biology	FB	1

Errata

For any questions, please reach out to Alba Garcia (alba.garcia.rodriguez@uab.cat).

Contact

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are no official prerequisites other than those for access to the degree. Nonetheless, it is recommended to review the subjects seen during high school regarding genetics, cell division, probability calculation and basic statistics.

Objectives and Contextualisation

The main objectives are:

- The understanding of the bases and mechanisms of biological inheritance as well as those of genetic improvement
- The ability to perform genetic analysis of the different characteristics of living organisms
- The ability to design and obtain information on genetic experiments as well as to interpret the results obtained
- The development of a historical vision that allows to summarize the main landmarks of genetics and to assess their contributions to current biology

Learning Outcomes

1. CM11 (Competence) Interpret relevant mathematical data that allow judgements to be made that include reflection on important social, scientific or ethical issues.
2. CM11 (Competence) Design genetics and genomics experiments adapted to the different fields of biology and respecting ethical principles and social needs.
3. KM16 (Knowledge) Describe the structure and organisation of nucleic acids in different groups of organisms.

4. KM17 (Knowledge) Define the mechanisms of heredity and the processes that regulate gene expression, as well as the fundamentals of genetic improvement.
5. KM18 (Knowledge) Identify the basic genetic mechanisms of evolutionary change.
6. KM19 (Knowledge) Identify the specific bibliographic sources in genetics that allow, in an autonomous way, to develop and extend the knowledge acquired.
7. SM13 (Skill) Carry out diferent kinds of genetic analyses of living beings using genomic techniques and interpreting the results obtained.
8. SM15 (Skill) Summarise the most relevant historical milestones in genetics, assessing their contributions to current biology.

Content

Theory

1. Introduction to Genetics: Biogenesis, development and biological inheritance; Genetics as a modern science.
2. The hereditary material: Nature and organization; Genes and Genomes; the chromosomes.
3. Cell division: Celular cicle and mitosis; Sexual reproduction and meiosis.
4. Variations in the hereditaru material: Mutations and Allels; Somatic and Germinal Mutations; Chromosomal variation.
5. Basic principals of inheritance: Genetic transmission; The works of Mendel; Segregation and dominance; Independent transmission.
6. Extensions of Mendelism: Sex and inheritance patterns; Multiple allele series; Lethality; Gene interaction; Environmental effects.
7. Mapping of eukaryotic chromosomes: Chromosomes and linkage; Recombination; Eukaryotic linkage maps.
8. Quantitative genetics: Genetic basis of quantitative traits; Statistical analysis of the quantitative traits; Phenotypic variation and heritability; Artificial selection.
9. Population genetics: Genotypic and allelic frequencies; The law of Hardy-Weinberg; The sources of variation.

Classroom problems

1. The hereditary material
2. Mendelisme
3. Chromosome linkage and recombination
4. Quantitative genetics
5. Population genetics

Laboratory practices

1. Introduction to the biology and morphology of *Drosophila melanogaster*
2. Analysis of a mutant and assignment to its linkage group
3. Elaboration of a simple linkage map

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory practices	9	0.36	CM11, CM11, KM17, KM18, SM13

Lectures	30	1.2	CM11, CM11, KM16, KM17, KM18, KM19, SM13, SM15
Problems sessions	11	0.44	CM11, CM11, KM16, KM17, KM18, SM13
Type: Supervised			
Tutorials	5	0.2	KM19
Type: Autonomous			
Individual study	68	2.72	CM11, CM11, KM16, KM17, KM18, KM19, SM13, SM15
Moodle participation	10	0.4	CM11, CM11, KM16, KM17, KM18, KM19, SM13, SM15
Problems solving	10	0.4	CM11, CM11, KM16, KM17, KM18, SM13

The development of the training activities of the course is based on: Lectures, problem classes and laboratory practice classes, each of them with its specific methodology.

Lectures: Lectures are based on master classes with ICT support. Emphasis is made to acquisition of important concepts and skills for the students. The audiovisual material used in class can be found in the *Moodle*. The students require developing independent learning strategies outside of class.

Problems: The sessions are performed in small groups which allow to deepen the information given on the master class and to work on specific areas of the course. These sessions promote students to apply the theoretical knowledge to solve practical problems, as well as to demonstrate their skills by solving problems on the blackboard.

Laboratory practices: These sessions are done in small groups. Here the student has the opportunity to work at the laboratory doing experiments related to practical cases of the subject. The data obtained in the experiments are analyzed and a global view of the techniques used is given. The students can access protocols and practice guides through the Moodle. To be able to attend it is necessary that the student justify having passed the biosafety and security tests (*Moodle*) and accepts the operating rules of the laboratories of the *Facultat de Biosciènices*.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exams	75	6	0.24	CM11, KM16, KM17, KM18, SM13, SM15
Moodle activities	10	0.5	0.02	CM11, KM16, KM17, KM18, KM19, SM13, SM15
Practices	15	0.5	0.02	CM11, KM17, KM18, SM13

The evaluation of the subject is a continuous process within the teaching period and conforms to the UAB Evaluation Regulations.

The skills and concepts of this subject will be assessed through different activities:

1 Teory and problems: These exams include the evaluation of the skills worked on in the theory and problem classes. Three tests will be held throughout the semester. The grade of each test corresponds to 25% of the final grade.

2 Practices. Each of the practice sessions will be evaluatedby means of a test. The grade of practices represents 15% of the final grade of the course. Attendance at practices is mandatory.

3 ***Moodle*** activities. Students will be able to participate in solving problems and quizzes that they will find in the subject's Moodle classroom in the Virtual Campus. Results and participation in this activity will be evaluated. These activites represent 10% of the final grade of the course.

Final considerations:

1. The course will be approved when the final weighted mark is greater than or equal to 5.0.
2. Students with a weighted final grade of less than 5.0 may take a final exam. The grade for this exam will replace the average grade for the three classroom exams. The students must have been previously evaluated in a set of activities the weight of which is equivalent to a minimum of 2/3 of the total grade of the subject. Therefore, the student will obtain the qualification of "Not Evaluable" when the evaluation activities carried out have a weighting of less than 67% in the final qualification.
3. Single evaluation. Students who have requested the single assessment of the subject will take the same final exam as students with a weighted grade ofless than5.0. The mark of this exam will correspond to 75% of the final mark of the subject. 15% of the final grade will correspond to the practical grade whose attendance is mandatory. The remaining 10% of the final mark will correspond to the participation in the activities, of Moodle. Single-assessment students who have a weighted final grade of less than 5.0 may take an extraordinary exam, whose grade will only replace the grade previously obtained from the final exam.

Bibliography

Theory

- Klug, W.S., M.R. Cummings, Ch.A. Spencer & M.A. Palladino (2013) Conceptos de Genética. 10a edició. Pearson Educación, S.A., Madrid. https://bibcercador.uab.cat/permalink/34CSUC_UAB/avjcib/alma991004958949706709
- Griffiths, A.J.F., S.R. Wessler, R.C. Lewontin & S.B. Carroll (2008) Genética. 9a edició. McGraw-Hill/Interamericana, Madrid. https://csuc-uab.primo.exlibrisgroup.com/permalink/34CSUC_UAB/avjcib/alma991008570979706709
- Pierce, B.A. (2009) Fundamentos de Genética. Conceptos y relaciones. Editorial Médica Panamericana, Madrid. https://csuc-uab.primo.exlibrisgroup.com/permalink/34CSUC_UAB/1eqfv2p/alma991002094809706709
- Pierce, B.A. (2016) Genética. Un enfoque conceptual. 5a edició. Editorial Médica Panamericana, Madrid. https://csuc-uab.primo.exlibrisgroup.com/permalink/34CSUC_UAB/1pvhgf7/alma991007007729706709
- Brown, T. A. (2023). Genomes 5. 5th edition. Boca Raton, Florida. https://bibcercador.uab.cat/permalink/34CSUC_UAB/cugbhl/alma991010871761406709
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Problems

- Benito, C. (1997). 360 problemas de Genética. Resueltos paso a paso. Editorial Síntesis, Madrid
- Elrod, S. & W.D. Stansfield (2002) Schaum´s Outline of Genetics. 4th edition. Mc Graw-Hill, USA

Software

None

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	111	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	112	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	111	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	112	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	113	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	114	Catalan	first semester	morning-mixed
(TE) Theory	11	Catalan	first semester	afternoon