UAB
Universitat Autònoma de Barcelona

Genetic Risk

2026/2027

Code: 42930
Credits: 6

Degree programme	Type	Course
Advanced Genetics	OP	0

Contact lecturer

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Group languages

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

Prerequisites

There are no special prerequisites for this module, other than those of the master's degree.

Objectives

The objective of this module is to add aknowledgement on the concepts of genetic risk and in the use of biomonitoring data to detect human populations

at risk.

Learning outcomes

1. Write critical summaries about the taught seminars.
2. Students should be capable of integrating knowledge and facing the complexity of making judgements using information that may be incomplete or limited, including reflections on the social and ethical responsibilities linked to that knowledge and those judgements.
3. Present summaries and conclusions in public.
4. Demonstrate updated knowledge of the methodology used in determining levels of genetic damage.
5. Demonstrate mutagenic properties of agents in relation to levels of prokaryote and eukaryote complexity.
6. Integrate scientific and legal knowledge that enables students to acquire an awareness of the risks associated with changed induced by the DNA molecule.
7. Differentiate between the risk components associated with changes in DNA and modulations as a result of individual genetic characteristics.
8. Apply bibliographical information about rules and legislation in risk assessment.
9. Demonstrate responsibility in the management of information and knowledge and in the direction of groups and/or projects in multidisciplinary teams.
10. Write a report that considers the use of the methodology used in the module to resolve a specific problem.
11. Use scientific terminology to argue the results of the research and show how to communicate in spoken and written English in an international setting.

Contents

Theme 1. Genetic damage

Basic concepts. DNA damage vs mutation. Types of genetic damage. Spontaneous vs induced DNA damage. Germinal vs somatic mutations. Consequences for human health.

Theme 2. Genetic risk

Definitions. Components. Genetic hazards. Genotoxic potency. Exposure. Genetic risk assessment. Risk management.

Theme 3. Ways to measure genetic damage

Short-term assays classification. Evaluation strategies. Concept of battery. Organisms and assays used to estimate the genotoxic potential.

Theme 4.Ways to measure exposure

Concepts of exposure. Processes for exposure assessment. Exposure and genetic risk. Sources of exposure.

Theme 5. Mutation-Cancer relationship

Genotoxic carcinogens. Non-genotoxic carcinogens. Epidemiological data as a source to detect agents with genotoxic activity

Theme 6. Human Biomonitoring

Concept of human biomonitoring. Sampling procedures

Theme 7. Biomonitoring and chromosome damage

Methods to estimate chromosome damage. The micronucleus assay as a model. Usefulness of FISH technologies. Role of chromosome damage in the genetic risk

Theme 8. Biomonitoring and primary DNA damage

Methods to estimate primary DNA damage. The comet assay as a model. Oxidative DNA damage. Role of primary DNA damage in the genetic risk

Theme 9. Biomonitoring and gene mutations

Molecular analysis of somatic mutations: hprt and HLA. Molecular epidemiology and biomarkers of occupational cancer. Oncogenes and their proteins. The ras gene and the protein p21. The p21 protein as a biomarkers of cancer.

Theme 10. Biomarkers of individual sensitivity

Biomarkers of interindividual variation. Interindividual variation and genotoxic exposure. Genomic instability.

Theme 11. Factors modulating the genetic risk

Endogen factors.Basal levels of mutation Other factors.

Theme 12. Examples of biomonitoring studies

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Lectures	40	1.6	
Seminars, reviews	16	0.64	
Assignments, readings, and personal study	85	3.4	

Interactive lectures form the core of this course. During these sessions, professors present the syllabus while actively encouraging student participation, a proactive attitude, and scientific rigor in discussions.

For certain topics, students will work in groups of 2 or 3 to prepare a brief written assignment. This delivery will either summarize the papers discussed in class or address specific questions related to the syllabus.

Some topics will be taught in a seminar format. For these sessions, students will receive background materials to prepare their assigned topic, which will then be presented and discussed in class.

In this course, the use of Artificial Intelligence (AI) technologies is permitted as an integral part of the development of assignments, provided that the final outcome reflects a significant contribution from the student in terms of personal analysis and reflection. The student must clearly identify which parts have been generated using such technology, specify the tools used, and include a critical reflection on how these have influenced both the process and the final result of the activity. A lack of transparency in the use of AI will be considered a breach of academic integrity and may result in a penalty in the assignment grade, or more severe sanctions in serious cases.

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

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Exams	60	4	0.16	2, 4, 5, 6, 7
Continuous assessment (deliverables, tests, participation)	15	3	0.12	2, 8, 9, 10, 11
Seminars	25	2	0.08	1, 3, 9, 11

Continuous assesment

Students must pass a final exam to demonstrate that they have reach an acceptable degree of acknowledge on the different topics discussed in the module. The written responses will constitute the prove of the level reached.

From some themes, students must respond some questions/ short test exam regarding the topics included in the theme.

Finally, students must present and discuss special topics of the module to the rest of the classmates.

Single assessment

Students who so request will be entitled to a single assessment. The single assessment will consist of a single summary test in which the contents of the entire theory program of the subject will be assessed. The grade obtained in this synthesis test will be account for 60% of the final grade of the subject.

The evaluation of the seminars will follow the same process as the continuous evaluation. The grade obtained will acount for 25% of the final grade of the subject.

The delivery of the deliverables will follow the same procedure as the continuous evaluation.

The single assessment test will coincide with the same date fixed in the calendar for the last continuous assessment test and the same recovery system will be applied as for the continuous assessment.

Bibliography

The student will receive a list of references via Campus Virtual

Software

Not required

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TEm) Theory (master)	1	English	first semester	morning-mixed