Universitat Autònoma de Barcelona

2023/2024

Genetic Risk

Code: 42930
ECTS Credits: 6

Degree	Type	Year	Semester
4313802 Advanced Genetics	OT	0	1

Contact

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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject.
Please note that this information is provisional until 30 November 2023.

Prerequisites

There are no special pre-requisites in this module, other than those of the master's degree.

Objectives and Contextualisation

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

Competences

- Demonstrate a mastery of genetic analysis as a transversal tool applicable to any field of genetics.
- Demonstrate responsibility in management of information and knowledge.
- Design and apply scientific methodology in resolving problems.
- Identify and propose scientific solution for problems related to genetic research at both molecular and organism levels and demonstrate an understanding of the complexity of living beings.
- Integrate knowledge of the possible alterations in DNA with their consequences for living beings.
- 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.
- Students should know how to apply the knowledge they acquire and be capable of solving problems in new or little-known areas within broader contexts (or multidisciplinary contexts) related to their area of study.

- Students should know how to communicate their conclusions, knowledge and final reasoning that they hold in front of specialist and non-specialist audiences clearly and unambiguously.
- Use and manage bibliographical information and other resources related to genetics and related fields.
- Use scientific terminology to argue the results of the research and show how to communicate in spoken and written English in an international setting.

Learning Outcomes

1. Apply bibliographical information about rules and legislation in risk assessment.
2. Demonstrate mutagenic properties of agents in relation to levels of prokaryote and eukaryote complexity.
3. Demonstrate responsibility in the management of information and knowledge and in the direction of groups and/or projects in multidisciplinary teams.
4. Demonstrate updated knowledge of the methodology used in determining levels of genetic damage.
5. Differentiate between the risk components associated with changes in DNA and modulations as a result of individual genetic characteristics.
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. Present summaries and conclusions in public.
8. 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.
9. Use scientific terminology to argue the results of the research and show how to communicate in spoken and written English in an international setting.
10. Write a report that considers the use of the methodology used in the module to resolve a specific problem.
11. Write critical summaries about the taught seminars.

Content

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

Methodology

Lectures will constitute the main part of the course.

For some lessons, the student will prepare a written work summarizing one of the papers discussed in the clasroom.

Several topics will be explained as a seminars. To cover this topic, the students will receive material to prepare the theme that will be exposed and discused in the class.

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lectures	110	4.4	
Type: Supervised			
Seminars	30	1.2	

Assessment

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 to 1-2 questions 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 50% 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.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exams	50	5	0.2	2, 4, 5, 6, 8
Papers review	25	4	0.16	1, 3, 10, 8, 9
Seminars	25	1	0.04	3, 11, 7, 9

Bibliography

The student will receive a list of references via Campus Virtual

Software

Not required