UAB
Universitat Autònoma de Barcelona

Cancer and Radiobiology

2026/2027

Code: 42942
Credits: 6

Degree programme	Type	Course
Cytogenetics and Reproductive Biology	OP	1

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Group languages

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

Prerequisites

There are not

Objectives

- To recognize cytogenomic alterations related to specific cancer types and to understand their importance for diagnosis and prognostics.

- To explain the molecular bases of breast cancer, including genetic, epigenetic, and hormonal changes, as well as the influence of environmental factors.

- To know the biological effects of ionizing radiation interaction with DNA.

Learning outcomes

- CA12 (Propose an adequate diagnosis based on the interpretation of genetic and cytogenetic analyses in cases of cancer and radiation exposure, demonstrating possible biases based on sex.) Propose an adequate diagnosis based on the interpretation of genetic and cytogenetic analyses in cases of cancer and radiation exposure, demonstrating possible biases based on sex.
- CA13 (Plan genetic and cytogenetic testing to make an adequate prognosis in cases of cancer and radiation exposure.) Plan genetic and cytogenetic testing to make an adequate prognosis in cases of cancer and radiation exposure.
- KA15 (Identify the origin and cellular and molecular foundations of human pathologies associated with genetic and epigenetic changes.) Identify the origin and cellular and molecular foundations of human pathologies associated with genetic and epigenetic changes.
- KA16 (Explain the socio-economic, environmental and cultural impact of research, innovation and technological development in the field of genetics and cytogenetics.) Explain the socio-economic, environmental and cultural impact of research, innovation and technological development in the field of genetics and cytogenetics.
- SA16 (Apply genetic analysis protocols and bioinformatics resources when characterising tumours and analysing and interpreting clinical cases in the field of cancer.) Apply genetic analysis protocols and bioinformatics resources when characterising tumours and analysing and interpreting clinical cases in the field of cancer.
- SA17 (Critically analyse research data in the field of cancer and radiobiology, integrating theoretical and methodological knowledge to formulate well-supported conclusions.) Critically analyse research data in the field of cancer and radiobiology, integrating theoretical and methodological knowledge to formulate well-supported conclusions.
- SA18 (Solve clinical cases in the field of cancer and radiobiology, applying the genetic and cytogenetic knowledge necessary to interpret results and formulate the diagnosis or prognosis.) Solve clinical cases in the field of cancer and radiobiology, applying the genetic and cytogenetic knowledge necessary to interpret results and formulate the diagnosis or prognosis.

Contents

Part 1: Bases of Cancer Genomic Instability. The unstable genome of the tumor cell. Chromosomal instability and genomic instability. Chromatrypsis derived from micronuclei and chromosomal bridges. Modulating factors of genome instability. Genomic instability and age.

Part 2: Cancer Genetics: Solid Tumors. Cancer genomics. Patterns of intratumoral heterogeneity. Cancer treatment in the era of personalized medicine. Detection of changes in the genome of tumor cells and identification of the genetic cause in families with hereditary cancer syndromes. Non-invasive genetic diagnosis of solid tumors.

Part 3: Molecular Mechanisms of Cancer: The Breast Cancer Model. Cancer and the molecular mechanisms involved: breast cancer. Embryology, morphology and physiology of the normal breast and changes in breast

cancer. Genetic and epigenetic factors. Endocrine factors and mechanisms of hormonal action. Environmental factors and lifestyle. Clinical basis of breast pathology, metastasis. Biological prognostic factors. Diagnosis of mutations in hereditary breast cancer and prevention. Genetic counselling in families with gynaecological neoplasms.

Part 4: Cancer genetics: Hematological neoplasms. Genetics and cytogenetics of haematological neoplasms: acute leukaemias, chronic leukaemias and lymphomas. Paediatric lymphomas. Detection of genetic and cytogenetic changes in haematological neoplasms.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Master classes	40	1.6	CA12, CA13, KA15, KA16, SA16, SA17, SA18
Homework presentation and scientific articles discussion	17	0.68	SA16, SA17, SA18
Scientific papers reading and study	82	3.28	CA12, CA13, KA15, KA16

The teaching methodology will consist of:

1.- Theoretical lessons.

2.- Classroom practices

3.- Discussion of scientific papers. Students must have read the papers beforehand to discuss them in class.

4.- Presentation of assignments

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
Homework presentation	63%	4	0.16	CA12, CA13, KA15, KA16, SA16, SA17, SA18
Attendance and active participation	10%	3	0.12	CA12, CA13, KA15, KA16, SA16, SA17, SA18
Examination	27%	4	0.16	CA12, CA13, KA15, KA16, SA16, SA17, SA18

To pass the subject, a minimum mark of 5 out of 10 is required. The final grade will be obtained by taking the weighted average of the different tests according to the weight of the teaching in each lesson. This weight will be maintained for the establishment of the final score, considering that attendance and active participation represents 10% of the final grade of each subject. The evaluation will consist of different types of tests: exams, preparation, and presentation of assignments and/or the resolution of problems and questions.

The students that did not pass, have the opportunity of a retake that will consist of a written exam, where the three topics will be weighted in a balanced way. To participate in the retake, the students must have been

previously evaluated in a set of activities whose weight equals a minimum of two-thirds of the total grade of the subject or module. Therefore, students will obtain the \"No Evaluable\" qualification when the assessment activities carried out have a weight less than 67% in the final mark.

In this course, the use of Artificial Intelligence (AI) technologies is permitted exclusively for support tasks, such as literature or information searches, text proofreading, or translation. Students must clearly identify which parts of their work have been generated using these technologies, specify the tools used, and include a critical reflection on how these tools have influenced both the process and the final outcome of the assignment. Failure to disclose the use of AI in this assessed activity will be considered a breach of academic integrity and may result in a partial or total reduction of the assignment grade, or more severe disciplinary sanctions in serious cases.

Any irregularity committed in an assessment activity (including academic fraud, plagiarism, or the improper use of AI, unless such use is expressly authorized in the course syllabus) that may lead to a significant alteration of the grade will result in a grade of 0 for that assessment activity. If the course syllabus establishes that obtaining a minimum grade in that assessment activity is an essential requirement for passing the course, or if multiple irregularities occur in the assessment activities of the same course, the final grade for the course will be 0. Furthermore, disciplinary proceedings may be initiated against any student who commits any of these irregularities.

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Software

Web-based CNApp and MUSICA tools

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	Catalan/Spanish	first semester	morning-mixed
(PAULm) Classroom practices (master)	1	Catalan	first semester	morning-mixed