# Cancer and Radiobiology

**Contact**

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**Teachers**

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Laura Tusell Padrós  
Gemma Armengol Rosell

**Use of languages**

Principal working language: catalan (cat)

<table>
<thead>
<tr>
<th>Degree</th>
<th>Type</th>
<th>Year</th>
<th>Semester</th>
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<tr>
<td>4313782 Cytogenetics and Reproductive Biology</td>
<td>OT</td>
<td>0</td>
<td>1</td>
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</table>

## Prerequisites

There are not

## Objectives and Contextualisation

- To describe chromosome and molecular alterations related to specific cancer types and 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 explain the biological effects of ionizing radiation interaction with DNA.

## Skills

- Apply the basic tools of statistical analysis in cytogenetics and reproductive biology.  
- Apply the scientific method and critical reasoning to problem solving.  
- Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.  
- Continue the learning process, to a large extent autonomously.  
- Design experiments, analyse data and interpret findings.  
- Identify and take into account the genetic, epigenetic and hormonal changes involved in the development of cancer in pursuit of a correct diagnosis and prognosis (Specialisation in Cytogenetics).  
- Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
• Interpret, resolve and report on clinical cases or scientific findings in the area of the master's degree.
• Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
• Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
• Use and manage bibliography or ICT resources in the master's programme, in one's first language and in English.
• Use creative, organisational and analytic skills when taking decisions.

Learning outcomes

1. Apply the scientific method and critical reasoning to problem solving.
2. Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
3. Continue the learning process, to a large extent autonomously.
4. Describe the importance of chromosomal and molecule alterations in the diagnosis of certain cancers and their prognosis factor.
5. Design experiments, analyse data and interpret findings.
6. Explain the biological effects of the interaction of ionising radiations with DNA.
7. Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
8. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
9. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
10. Use and manage bibliography or ICT resources in the master's programme, in one's first language and in English.
11. Use creative, organisational and analytic skills when taking decisions.
12. Use statistical methods to estimate, through biological methods, the dose of exposure to ionising radiation.
13. Write articles or report scientific findings in the area of cancer or radiobiology.

Content

Lesson 1: Genetics of cancer

The unstable genome of a tumoral cell, telomeric dysfunction and chromosome instability. Genetics of haematological diseases. Acute leukaemia, the example of acute lymphoblastic leukaemia. Chronic leukaemia, the example of chronic lymphocytic leukaemia. Genetics of mesenchymal and epithelial solid tumours. Colon cancer as a model. Methodologies for genome analyses, transcriptome and methylome of the tumoral cell.

Lesson 2: Molecular mechanisms of breast cancer


Lesson 3: Radiobiology


Methodology

Teaching methodology will include:
1.- Master classes
2.- Discussion of research papers previously read
3.- Homework presentation

Activities

<table>
<thead>
<tr>
<th>Title</th>
<th>Hours</th>
<th>ECTS</th>
<th>Learning outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type: Directed</strong></td>
<td></td>
<td></td>
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<tr>
<td>Master classes</td>
<td>42</td>
<td>1.68</td>
<td>1, 4, 6, 8, 7, 9, 10</td>
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<tr>
<td><strong>Type: Supervised</strong></td>
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<td></td>
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<tr>
<td>Homework presentation and scientific articles discussion</td>
<td>15</td>
<td>0.6</td>
<td>1, 5, 11, 13, 2, 7, 3, 10, 12</td>
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<td><strong>Type: Autonomous</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Scientific papers reading and study</td>
<td>82</td>
<td>3.28</td>
<td>7, 3, 10</td>
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</table>

Evaluation

The course consists in three lessons with a weight, in time, of about 40% for lessons 1 and 2 and 20% for lesson 3. This weight will be maintained for the establishment of the final score. Lesson 1 will be scored by an exam (35% of the final score), and lessons 2 and 3 by discussion of papers and homework presentation (55%). Finally, attending and active participation will represent a 10% of the final score.

Evaluation activities

<table>
<thead>
<tr>
<th>Title</th>
<th>Weighting</th>
<th>Hours</th>
<th>ECTS</th>
<th>Learning outcomes</th>
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<tr>
<td>Attendance and active participation</td>
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<td>0.12</td>
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<tr>
<td>Examination</td>
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<td>4</td>
<td>0.16</td>
<td>4, 6, 8, 2, 9, 10</td>
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<td>Homework presentation</td>
<td>55%</td>
<td>4</td>
<td>0.16</td>
<td>1, 4, 5, 6, 11, 13, 8, 2, 7, 3, 9, 10, 12</td>
</tr>
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</table>

Bibliography


