

SUBJECT TEACHING GUIDE

440 - Molecular Bases of Cell Proliferation, Differentiation and Death

University Master's Degree in Molecular Biology and Biomedicine

Academic year 2025-2026

1. IDENTIFYING DATA					
Degree	University Master's Degree in Molecular Biology and Biomedicine			Type and Year	Optional. Year 1
Faculty	Faculty of Medicine				
Discipline	Optional Subjects Module				
Course unit title and code	440 - Molecular Bases of Cell Proliferation, Differentiation and Death				
Number of ECTS credits allocated	5	Term	Semester based (1)		
Web					
Language of instruction	English	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. BIOLOGIA MOLECULAR
Name of lecturer	IGNACIO VARELA EGOICHEAGA
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Other lecturers	JAVIER LEON SERRANO MARIA DOLORES DELGADO VILLAR JOSE PEDRO VAQUE DIEZ JUAN CARLOS ACOSTA COBACHO FERNANDO CALVO GONZALEZ MANUEL ROSA GARRIDO LUCIA GARCIA GUTIERREZ MAGDALENA MARIA FOLTMAN

3.1 LEARNING OUTCOMES

- Knowledge of the molecular mechanisms controlling cells proliferation, differentiation and death through the study of the signal transduction pathways, the molecular bases of replication, mitosis, DNA repair, oncogenic transcription factors and pathways of apoptosis

4. OBJECTIVES

To acquire basic knowledge on the molecular biology of cells proliferation, differentiation and death as well as associated pathologies, with special focus on cancer.

6. SUBJECT PROGRAM

CONTENTS

1	<p>PART 1. CELL BIOLOGY OF THE CANCER CELL</p> <ul style="list-style-type: none"> -The nature of cancer -Signalling pathways -Ras-ERK signalling and antitumoral therapy -G1 phase control and replication -Molecular control of mitosis -Molecular mechanisms in cancer: oncogenes -Molecular mechanisms in cancer: suppressor genes -Genomic instability and DNA repair
2	<p>PART 2. MOLECULAR BIOLOGY OF THE CANCER CELL</p> <ul style="list-style-type: none"> -Molecular targets in cancer therapy -Regulation of gene expression and cancer -Epigenetics and cancer -Oncogenic transcription factors and hematologic tumors -Cancer genomics -Molecular mechanisms of stem cell differentiation -Molecular biology of invasion and metastasis -Apoptosis pathways and cancer
3	<p>First block of topics: CELL BIOLOGY OF THE CANCER CELL</p> <ul style="list-style-type: none"> -The nature of cancer. Properties of cancer cells. -Molecular mechanisms in cancer: oncogenes. -Signalling pathways. -Ras-ERK signalling and antitumoral therapy -G1 phase control and replication -Molecular control of mitosis -Molecular mechanisms in cancer: suppressor genes <p>Second block of topics: MOLECULAR BIOLOGY OF THE CANCER CELL</p> <ul style="list-style-type: none"> -Molecular targets in cancer therapy -Regulation of gene expression and cancer - Epigenetics and cancer -Oncogenic transcription factors -Hematologic tumors Cancer genomics -Molecular mechanisms of stem cell differentiation -Molecular biology of invasion and metastasis -Apoptosis pathways and cancer -Genomic instability and DNA repair <p>Basic techniques in Cell Culture</p>
4	<p>Tutorial, evaluation, autonomous learning</p>

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
The students will be assigned two research articles that they must analyze individually and perform a questionnaire about the content of each article.	Others	No	No	20,00
Written test corresponding to the contents of the first part of the course	Written exam	No	Yes	40,00
Written test corresponding to the contents of the second part of the course	Written exam	Yes	Yes	40,00
		No	No	0,00

TOTAL 100,00

Observations

Students must obtain at least 40% of the maximum score in each of the two written tests and also the average score considering both must be at least 50% of the maximum score. If the first test is failed, it can be recovered together with the second test at the end of the course. If the student fail the course in the ordinary examination period, it will have the opportunity to perform a second attempt one week after finishing the course in a unique test corresponding to the full contents of the course.

Observations for part-time students

The same evaluation system will be used for part-time students.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Robert Weinberg . The Biology of Cancer³ ed 2023 Editorial W.W .Norton
 Gelmann, E.P. et al. Molecular Oncology. 2014. Cambridge University Press.