

PRACTICUM IN BIOLOGY AND CLINIC OF CANCER

1.- General information

Code	303003	Plan		ECTS	18
Type	Mandatory	Course	2025/2026	Periodicity	Annual
Language	English/Spanish				
Center	CANCER RESEARCH CENTER				
Virtual Platform	https://cicloud.dep.usal.es/				

1.1.- FACULTY

Professors	ALMEIDA PARRA, Julia (Catedrática USAL)	LORENZO MARTÍN, L. Francisco (Ramón y Cajal USAL)
	ALVAREZ FERNÁNDEZ, Mónica (Científica Titular CSIC)	MATEOS MANTECA, MARÍA VICTORIA, (Profesora titular USAL)
	BLANCO VENAVENTE, Sandra (Científico titular CSIC)	MARTÍN PENDÁS, Alberto (Profesor de investigación CSIC)
	BUENO NÚÑEZ, Andrés Avelino (Catedrático USAL)	MORENO PÉREZ, Sergio (Profesor investigación, CSIC)
	CASTELLANO SÁNCHEZ, Esther (Científico titular, CSIC)	MUÑOZ FÉLIX, José Manuel (Profesor Ayudante Doctor)
	DÍAZ RODRÍGUEZ, Elena (Profesora asociada USAL)	ORFAO DE MATOS, Alberto (Catedrático, USAL)
	DOSIL CASTRO, Mercedes (Profesora titular USAL)	PAÍNO GÓMEZ, MARÍA TERESA (Profesora Contratada Doctora, USAL)
	DROSTEN, Matthias (Investigador científico CSIC)	PANDIELLA ALONSO, Atanasio (Profesor Investigación CSIC)
	ÉSPARIS OGANDO, Azucena (Contratado doctor ISCIII)	PEREDA VEGA, José María de (Científico Titular, CSIC)
	FERNÁNDEZ MEDARDE Alberto (Profesor titular USAL)	PÉREZ LOSADA, Jesús (Investigador científico, CSIC)
	FERRANZ DÍAZ NURIA (Científica titular CSIC)	PERICACHO BURGOS, Miquel (Profesor titular, USAL)
	FUENTES GARCÍA, Manuel (Catedrático USAL)	RIVAS SANZ, Javier de las (Investigador Científico, CSIC)
	GARCÍA BUSTELO Xosé Ramón (Profesor Investigación CSIC)	RODRÍGUEZ BARBERO Alicia (Profesora titular, USAL)
	GARCÍA SÁNCHEZ, Mª José (Catedrática USAL)	SACRISTÁN MARTÍN, María de la Paz (Profesora titular, USAL)
	GONZÁLEZ SARMIENTO, Rogelio (Catedrático USAL)	SÁNCHEZ GARCÍA, Isidro (Investigador Científico, CSIC)
	GUERRERO ARROYO, Carmen (Catedrática USAL)	SANCHEZ-GUIJO MARTÍN, Fermín (Catedrático, USAL)
	HERNANDEZ RIVAS, Jesús María (Catedrático USAL)	SÁNCHEZ MARTÍN, MANUELA. (PDI, USAL)
	HOLGADO MADRUGA, Marina (Profesora titular USAL)	SÁNCHEZ NAVARRO, AMPARO (Catedrática USAL)
	HURTADO RODRÍGUEZ, Antoni (Investigador científico CSIC)	SANTAMARÍA, DAVID (Científico titular CSIC)

	LACAL ROMERO, Jesús (Profesor titular USAL)	SANTOS DE DIOS, Eugenio (Profesor emérito USAL)
	LLANO CUADRA, Elena (Catedrática USAL)	VICENTE MANZANARES, Miguel (Científico Titular CSIC)
	LÓPEZ DOMÍNGUEZ, JOSÉ A. (Contratado Ramón y Cajal USAL)	

2.- Prior recommendations

Students should be enrolled in those master's subjects that are best aligned with the research project they intend to carry out.

3.- Aims of the subject

To provide an experimental framework in which students can acquire the theoretical-practical knowledge and technical skills necessary to independently or collaboratively choose and develop a competitive scientific project in the experimental field of molecular biology of cancer.

4.- Competences to be acquired / Learning outcomes

Competencias

Basic Competences:

- Understand the meaning and scope of each of the basic experimental techniques in molecular and cellular biology (Southern, Northern, Western blotting, immunoprecipitation, in vivo assays, protein production, purification of tagged proteins, in vitro assays, flow cytometry, cloning, site-directed mutagenesis, etc.) and their applicability in addressing scientific questions.
- To know how a laboratory works, including its organization and the dynamics of both independent and team-based work.
- Ability to manage laboratory working time effectively.

Specific Competences:

- To acquire the technical skills necessary to develop a scientific project in the area.
- To develop the ability to design relevant experiments to confirm raised hypothesis.
- Students will be able to apply the scientific method to the experimental approaches that are used in cancer research.
- Know how to plan a clinical trial: susceptible population, inclusion and exclusion criteria, efficacy and toxicity assessment methods.

Transversal skills:

- Ability to interpret results and propose solutions in the face of limitations or deficiencies.
- Critical thinking and understanding the importance of multidisciplinary research for the knowledge of cancer.
- Scientific communication skills: the ability to understand and express oneself both orally and in writing.

5.- Contents (Syllabus)

The student will choose one of the following research projects.

These themes of work will be evaluated and adapted every academic year according to the availability and supply of researchers.

RESEARCH PROJECT 2025/2026	RESEARCH GROUP
"Biological characterization of T- and NK-cell neoplasms"	Julia Almeida Parra
"Mechanisms of therapy resistance in squamous cell carcinomas"	Mónica Álvarez Fernández
"Cancer epitranscriptomics"	Sandra Blanco Benavente
"Genomic stability: Regulation of replication and the DNA Damage Tolerance"	Andrés Avelino Bueno Núñez María Sacristán Martín
"Mitotic membranes and genome integrity"	Nuria Ferrándiz Díaz
"Molecular mechanisms mediating tumour:stroma crosstalk"	M. Esther Castellano Sánchez
"Ribosome synthesis in normal and cancer cells"	Mercedes Dosil Castro
"Molecular characterization of resistance mechanisms to targeted therapies in lung cancer"	Matthias Drosten
"Identification of novel therapeutic targets for KRAS-mutant lung cancer"	
"Role of Ras GEFs RasGrf1 and RasGrf2 in the Central Nervous System"	Alberto Fernández Medarde
"NanoMedicina en inmunoterapia y oncohematología"	Manuel Fuentes García
"Identification and validation of new oncogenic drivers in hematopoietic and solid tumors"	Xosé R. García Bustelo
"Development of new pharmacological strategies to block early oncogenic signaling proteins in cancer"	
"Hereditary cancer diagnosis. DNA repair and/or epigenetic modifiers in the treatment of cancer"	Rogelio González Sarmiento
"New treatments in hemopathies: from the laboratory to the clinic"	M Victoria Mateos Manteca Mercedes Garayoa Berrueta María Teresa Paíno Gómez
"Role of the bone marrow microenvironment in the pathology of multiple myeloma"	
"Study of new therapeutic combinations and resistance mechanisms in multiple myeloma: targeted drugs and immunotherapies"	
"Role of C3G in the biology of platelets and megakaryocytes. Understanding the role of C3G in hematopoiesis and hematopoietic stem cell (HSC) disorders"	
"Molecular Cytogenetics in Oncology"	Jesús María Hernández Rivas
"NGS and Big Data in hematological malignancies"	
"Mechanisms of hormone resistance and breast cancer"	Toni Hurtado

"Immuno-oncology and aging"	José A. López Domínguez
"Advanced cancer systems and oncogenomics"	L. Francisco Lorenzo Martín
"Development and characterization of new murine models of chromosomal instability and their involvement in cancer, aging and fertility"	Elena Llano Cuadra Alberto Martín Pendás
"The Gab1 docking protein in cancer and its possible use as a therapeutic target"	Marina Holgado
"Molecular mechanisms regulating cell growth and division: implications in cancer and aging"	Sergio Moreno Pérez
"New strategies for treatment of non-angiogenic tumors and metastases"	José Manuel Muñoz Félix
"Characterization of the genetic alterations and signaling pathways involved in the clonal development and neoplastic transformation of B cells of subjects with clonal B lymphocytosis (MBL) vs patients with chronic lymphatic leukemia (LLC)"	Alberto Orfao de Matos Julia Almeida Parra Manuel Fuentes García
"Antibody-drug conjugates in cancer"	Atanasio Pandiella Azucena Ésparis Ogando María Elena Díaz Rodríguez
"Structural biology of cell adhesion and signaling"	José María de Pereda Vega
"Model-Informed Precision Dosing of anticancer drugs"	Amparo Sánchez Navarro María José García Sánchez
"Population pharmacokinetics and dosage optimization strategies of anticancer drugs"	José Germán Sánchez Hernández Paulo Roberto Teixeira
"Molecular and Genetic Determinants of cancer susceptibility, evolution, and treatment response"	Jesús Pérez Losada
"Role of endoglin in angiogenesis and tumor angiogenesis"	Alicia Rodríguez Barbero Miguel Pericacho Bustos
"Bioinformatics and Functional Genomics in Cancer: discovery of biomarkers, gene signatures and regulators in omic data from patients, with a focus on transcriptomic and single-cell data"	Javier de las Rivas Sanz
"Bioinformatics and Computational Biology in Cancer: application of machine learning, deep learning and artificial intelligence to study prognosis, therapeutic response and resistance in cancer patients using omic data"	
"Mechanisms responsible for clonal evolution with the aim of leukemia prevention"	Isidro Sánchez García
"Bone marrow normal and leukemic niche and immune-effector cells"	Fermín Sánchez-Guijo Martín

BIOLOGY AND CLINICAL CÁNCER MÁSTER DEGREE

		Sandra Muntión
"Genome editing by CRISPR-Cas system technology: generation of new preclinical mouse models."		Manuel A. Sánchez Martín
"Novel RAS biology with therapeutic potential"		David Santamaría
"Structure and function of Ras oncogenes and their molecular regulators"		Eugenio Santos de Dios
"Role of TGFbeta signaling and EMT-TFs in the progression of hepatobiliary tumors"		Javier Vaquero Rodríguez
"Identification of new molecular targets for the treatment of hepatobiliary tumors"		
"Force generation and mechanotransduction during metastasis and tumor growth"		
"Mechanics of the tumor microenvironment and the anti-tumor immune response"		Miguel Vicente Manzanares
"Mechanical determinants of cellular plasticity during tumorigenesis and virus infection".		

6.- Teaching methodology

The eminently practical nature of this mandatory subject implies that students carry out their projects in the laboratory under the direct supervision and teaching of their researchers.

6.1.- Estimated learning time

		Hours tutored by the teacher		Individual work (hours)	TOTAL HOURS
		Attendance required (hours)	Distance learning (hours)		
Lectures		60			60
Practices	- In classroom				
	- In laboratory	350			350
	- In computer classroom				
	- Countryside				
	- Others (specify)				
Seminars		10			10
Work presentations and debates					
Tutorials		10			10
Online activities				19	19
Work preparation					
Other activities					
Exams - evaluation		1			1
TOTAL		431		19	450

7.- Materials, other bibliographical, electronic references or any other type of resource

8.- Assessment

8.1: Assessment Criteria:

8.2: Assessment Systems:

- Attendance at the designated laboratory will be evaluated always in accordance with the work program proposed by the tutor. (10% of the final grade)
- Ability to learn the laboratory techniques necessary to carry out the practical work assigned by the subject's tutor. (30% of the final grade)
- Professional interaction of the students with the members of the assigned laboratory and their ability to carry out teamwork. Attendance and capacity for interaction and participation in the seminars of the assigned group, understanding that both participation and the establishment of a critical dialogue are evaluable. (30% of the final grade)
- Ability to design and elaborate relevant experiments autonomously, as well as their ability to select scientific works and assess their contribution to the research topic; it is therefore about evaluating the maturity and critical capacity acquired by the student. (30% of the final grade).

8.3: General Considerations and Recommendations for Assessment and Resits:

9.- Weekly Teaching Schedule