PRACTICUM IN BIOLOGY AND CLINIC OF CANCER

1.- General information

Code	303003	Plan		ECTS	18
Type	Mandatory	Course	2026/2027	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)	MATEOS MANTECA, MARÍA VICTORIA, (Profesora titular USAL)
ALVAREZ FERNÁNDEZ, Mónica (Científica Titular CSIC)	MARTÍN PENDÁS, Alberto (Profesor de investigación CSIC)
BLANCO VENAVENTE, Sandra (Científico titular CSIC)	MORENO PÉREZ, Sergio (Profesor investigación, CSIC)
BUENO NÚÑEZ, Andrés Avelino (Catedrático USAL)	MUÑOZ FÉLIX, José Manuel (Profesor Ayudante Doctor)
CASTELLANO SÁNCHEZ, Esther (Científico titular, CSIC)	ORFAO DE MATOS, Alberto (Catedrático, USAL)
DÍAZ RODRÍGUEZ, Elena (Profesora asociada USAL)	PAÍNO GÓMEZ, MARÍA TERESA (Profesora Contratada Doctora, USAL)
DOSIL CASTRO, Mercedes (Profesora titular USAL)	PANDIELLA ALONSO, Atanasio (Profesor Investigación CSIC)
DROSTEN, Matthias (Investigador científico CSIC)	PEREDA VEGA, José María de (Científico Titular, CSIC)
ÉSPARIS OGANDO, Azucena (Contratado doctor ISCIII)	PÉREZ ANDRÉS MARTÍN (Profesor Titular USAL)
FERNÁNDEZ MEDARDE Alberto (Profesor titular USAL)	PÉREZ LOSADA, Jesús (Investigador científico, CSIC)
FERRANZ DÍAZ NURIA(Científico titular CSIC)	PERICACHO BURGOS, Miguel (Profesor titular, USAL)
FUENTES GARCÍA, Manuel (Catedrático USAL)	RIVAS SANZ, Javier de las (Investigador Científico, CSIC)
GARAYOA BERRUETA, Mercedes (Contratado Dr.)	ROBLES VALERO, Javier (Profesor Ayudante Dr. USAL)
GARCÍA BUSTELO Xosé Ramón (Profesor Investigación CSIC)	RODRÍGUEZ BARBERO Alicia (Profesora titular, USAL)
GONZÁLEZ SARMIENTO, Rogelio (Catedrático USAL)	SACRISTÁN MARTÍN, María de la Paz (Profesora titular, USAL)
GUERRERO ARROYO, Carmen (Catedrática USAL)	SÁNCHEZ GARCÍA, Isidro (Investigador Científico, CSIC).
HERNÁNDEZ RIVAS, Jesús María (Catedrático USAL)	SÁNCHEZ–GUIJO MARTÍN, Fermín (Catedrático, USAL)
HERRERO HERNÁNDEZ, ANA BELÉN (Profesora Titular)	SÁNCHEZ MARTÍN, MANUEL A. (PDI, USAL)
HOLGADO MADRUGA, Marina (Profesora titular USAL)	SÁNCHEZ NAVARRO, AMPARO (Catedrática USAL)

	HURTADO RODRÍGUEZ, Antoni (Investigador científico CSIC)	SANTAMARÍA, DAVID (Científico titular CSIC)
	LLANO CUADRA, Elena (Catedrática USAL)	SANTOS DE DIOS, Eugenio (Profesor emérito USAL)
	LÓPEZ DOMÍNGUEZ, JOSÉ A.(Contratado Ramón y Cajal USAL)	VAQUERO RODRÍGUEZ, Javier (Ramón y Cajal CSIC)
	LORENZO MARTÍN, L. Francisco (Ramón y Cajal USAL)	VICENTE MANZANARES, Miguel (Científico Titular CSIC)

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 adquire 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 2026/2027	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
"*DNA Replication Stress and Damage Tolerance: Drivers of Genomic Instability in Cancer*"	Andrés Avelino Bueno Núñez María Sacristán Martín
"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" "Identification and validation of novel therapeutic targets KRAS for KRAS-mutant lung cancer"	Matthias Drosten
"Analysis of SOS proteins as therapeutic targets in cancer"	Alberto Fernández Medarde
"Mitotic membranes and genome integrity"	Nuria Ferrándiz Díaz
"NanoMedicina en inmunoterapia y oncohematología"	Manuel Fuentes García
"Identification and validation of new oncogenic drivers in hematopoietic and solid tumors" "Development of new pharmacological strategies to block early oncogenic signaling proteins in cancer"	Xosé R. García Bustelo
"Hereditary cancer diagnosis. DNA repair and/or epigenetic modifiers in the treatment of cancer" "Functional Characterization of Genetic Variants in Hereditary Cancer" "Novel Therapeutic Strategies and Drug Combinations in Cancer Treatment"	Rogelio González Sarmiento Ana Belén Herrero Hernández
"New treatments in hemopathies: from the laboratory to the clinic" "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"	M Victoria Mateos Manteca Mercedes Garayoa Berrueta María Teresa Paíno Gómez
"Role of C3G in the biology of platelets and megakaryocytes. Understanding the role of C3G in hematopoiesis and hematopoietic stem cell (HSC) disorders"	Carmen Guerrero Arroyo
"Molecular Cytogenetics in Oncology" "NGS and Big Data in hematological malignancies"	Jesús María Hernández Rivas

"Mechanisms of hormone resistance and breast cancer"	Toni Hurtado
"Mechanisms of cellular senescence" "Immune regulation in post-therapy tumors"	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 lymphoid clones and their immune microenvironment in pre-tumoral conditions (MBLIo, T-CUS, IgM MGUS and non-IgM MGUS) for the identification of risk of progression and early death in the general population”	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
“Characterization of lymphoid clones and their immune microenvironment in patients with immunodeficiency: implications for the ontogeny and early diagnosis of lymphoma”	Martín Pérez Andrés
“Model-Informed Precision Dosing of anticancer drugs” “Population pharmacokinetics and dosage optimization strategies of anticancer drugs”	Amparo Sánchez Navarro José Germán Sánchez Hernández Hinojal Zazo Gómez
“Molecular and Genetic Determinants of Cancer Susceptibility, Tumor 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” “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”	Javier de las Rivas Sanz

“Functional characterization of GTPase-driven oncogenic pathways in hematological tumors”	Javier Robles Valero
“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 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" "Identification of new molecular targets for the treatment of hepatobiliary tumors"	Javier Vaquero Rodríguez
"Force generation and mechanotransduction during metastasis and tumor growth" "Mechanics of the tumor microenvironment and the anti-tumor immune response" "Mechanical determinants of cellular plasticity during tumorigenesis and virus infection".	Miguel Vicente Manzanares

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