

Course unit name: MOLECULAR BASIS OF CELL MIGRATION AND METASTASIS

1.- General information

Code	303032	Plan		ECTS	3
Type	Elective	Course	2024/2025	Periodicity	1 st Semester
Department	Cancer Research Center				
Virtual Platform	Platform:	STUDIUM			
	URL de Acces:	https://studium.usal.es			
Language	This subject is taught in English				

Faculty

Professor Coordinator	Dr. Miguel Vicente Manzanares				
Research area	Tumour biophysics				
Center	Cancer Research Center				
Office	Laboratory 6				
Tutorials	Appointment by email				
URL Web	https://www.cicancer.org/grupo?id=69				
E-mail	miguel.vicente@usal.es	Phone	+34 923294806		

Professor	Dr. Javier Robles Valero				
Department	Biochemistry and Molecular Biology (USAL)				
Center	Cancer Research Center				
Office	Laboratory 2				
URL Web	https://www.cicancer.org/investigador?id=9d1e7abf-ab43-4b20-8f59-2ddfbab6aecd				
Tutorials	Appointment by email				
E-mail	jrobles@usal.es	Phone	+34 923294802		

2.- The course in the context of the Master's Program

Training Module

Third block (out of five) of master program organization.

General aim of the subject

In a modern cancer biology course, understanding the molecular mechanisms of metastasis and how they relate to the physiological processes of adhesion and migration is absolutely necessary.

Professional specialization

Graduate students in life sciences and/or biomedicine; medicine; pharmacy; physics and chemistry.

3.- Previous recommendations

As this course is taught in English, a high level of English (B2 or higher) is required.

4.- Aims of the subject

This course is a comprehensive graduate-level overview of the field of cell migration and adhesion focused on, but not limited to, the field of tumor cell migration and metastasis. The course ranges from the discovery of adhesion molecules to modern experimental approaches and methods. We will underline the cross-disciplinary nature of the field, including contributions from basic cell biology, neurobiology, immunology, biochemistry and molecular biology. The main objective of the course will be to acquire a critical and integrated approach to both classical and modern techniques, including the most recent approaches, that allow the study of cell adhesion, motility and migration. In addition, the student will acquire skills in the critical analysis of scientific literature through workshops discussing articles and experiments related to the different modules of the course. Lectures and student presentations will be conducted in English to develop students' integration into a real research environment.

5.- Contents

Part I. Receptors and signals involved in cell migration.

1. Adhesion, migration, and chemotaxis: General concepts.
2. Adhesion receptors: integrins and others (integrin ligands, GPCR, Selectins and Eph)

Part II. The cytoskeleton and the generation of movement in migrating cells

3. Actin cytoskeleton and cell migration. Polymerization, cross-linking and regulation.

4. Contractility in cell migration. Actin and tubulin motors. Microtubules and intermediate filaments.
5. Introduction to mechanobiology and mechanical aspects of cell migration.
6. Actin regulation
7. Workshop: About in vitro cell migration and adhesion methodologies.

Part III. In vivo cell migration

8. Migration in leukemia and inflammatory processes.
9. Migration in the central nervous system.
10. Migration and metastasis in solid tumors.

ONLINE ONLY CONTENT

Principles of microscopy (2h in three lectures)

6.- Skills to be acquired

Basic skills

- Gathering of knowledge and facts.
- Preparation of topics, compilation of bibliography, presentation (in English), resolution of questions in seminar format.

7.- Teaching methodology

The course will last 10 sessions of 2 h, organized into 3 blocks. The course also includes two discussion sessions or workshops on articles/experiments/presentations that will be led by the professors.

1.- There will be 10 lectures of 2 hours for the Introduction of the course and the theoretical presentations (22 hours).

2.- Two sessions of 2 hours will be devoted to discussion workshops on articles and experiments related to the module or practical demonstrations (2 x 2 = 4 hours). The corresponding professor-tutor will be available (1 hour) for any doubts or queries.

3.- Students are required to watch and study the online materials regarding the microscopy part of the curriculum (1x2=2 hours), and additional off-site time (up to a maximum of 75h total, including the hours described above) should be devoted to studying the provided materials, resolving workshop questions and general study of the subject.

8.- Estimated learning time

	Hours tutored by the teacher		Individual work (hours)	TOTAL HOURS
	Attendance required (hours)	Distance learning (hours)		
Lectures	20	6		26
Practices	- In classroom			
	- In laboratory			
	- In computer classroom			
	- Countryside			
	- Visualization classroom			
Seminars	4			4
Work presentations and debates				
Tutorials	1			1
Online activities				
Work preparation	14			14
Other activities			30	30
Exams - evaluation				
TOTAL	39	6	30	75

9.- Materials

Books

The biology of cancer, R. Weinberg (2013, Garland).

Other bibliographical, electronic references or any other type of resource

It will be provided by the instructors throughout the course.

10.- Assessment

Assessments on the performance of the student

The evaluation will be carried out in the workshop sessions, assessing the work presented and its defence, as well as the active participation of the student both in the lectures and during the debate generated in the workshops.

Recommendations