

## MOLECULAR BASIS OF CELL MIGRATION AND METASTASIS

1.- General information					
Code	303032	Plan		ECTS	3
Type	Elective	Course	2026/2027	Periodicity	1 <sup>st</sup> Semester
Language		English			
Department	<a href="#">Cancer Research Center</a>				
Virtual Platform	Studium				

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

Professor	Dr. Javier Robles Valero		
Department	Biochemistry and Molecular Biology (USAL)		
Center	<a href="#">Cancer Research Center</a>		
Office	Laboratory 2		
URL Web	<a href="https://www.cicancer.org/investigador?id=9d1e7abf-ab43-4b20-8f59-2ddfbab6aecd">https://www.cicancer.org/investigador?id=9d1e7abf-ab43-4b20-8f59-2ddfbab6aecd</a>		
Tutorials	Appointment by email		
E-mail	<a href="mailto:jrobles@usal.es">jrobles@usal.es</a>	Phone	+34 923295802

## 2.- Previous recommendations

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

## 3.- 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.

#### **4.- Skills to be acquired / Learning outcomes**

##### **Skills**

##### **4.1: Basic skills:**

-Gathering of knowledge and facts.

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

##### **4.2: Specific skills:**

##### **4.3: Transferable skills:**

#### **5.- Contents (Syllabus)**

##### **LESSONS:**

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.- Teaching methodology**

The course will last 20 sessions of 1 hour, 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 20 lectures of 1 hour 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.

<b>6.1.- Estimated learning time</b>				
	Hours tutored by the teacher		Individual work (hours)	TOTAL HOURS
	Attendance required (hours)	Distance learning (hours)		
<b>Lectures</b>	20	5	5	30
<b>Practices</b>	- In classroom			
	- In laboratory			
	- In computer classroom			
	- Countryside			
	- Others (specify)			
<b>Seminars</b>	6			6
<b>Work presentations and debates</b>				
<b>Tutorials</b>	2			2
<b>Online activities</b>				
<b>Work preparation</b>			15	15
<b>Other activities</b>			20	20
<b>Exams - evaluation</b>	2			2
<b>TOTAL</b>	<b>40</b>	<b>5</b>	<b>30</b>	<b>75</b>

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

The biology of cancer, R. Weinberg (2013, Garland).  
It will be provided by the instructors throughout the course.

**8.- Assessment**

**8.1: Assessment Criteria:**

- Exam (30%):** Evaluation of the understanding of fundamental concepts, molecular mechanisms, and techniques presented in the lectures and online material.
- Work Presentation (60%):** Assessment of the capacity for critical analysis of scientific literature, clarity of the presentation, and the quality of the defense of the work presented.
- Participation (10%):** Consideration of active attendance, questions asked during sessions, and involvement in the debates generated during presentations.

**8.2: Assessment Systems:**

- Written Exam:** Multiple-choice exam, which may include some short-answer questions.

- Evaluation of Presentations:** Specific rubric and peer-to-peer assessment.
- Participation:** Continuous monitoring by the teaching staff during face-to-face sessions.

**8.3: General Considerations and Recommendations for Assessment and Resit:**

- Language:** All assessment components (exam, presentations, and written material) will be conducted exclusively in English.
- Students who do not pass the final exam and the workshops will have an extraordinary call consisting of a global exam covering the entire subject.

**9.- Weekly Teaching Schedule**