

Course unit name: BIOPHYSICAL AND MOLECULAR BASES OF CELL MIGRATION AND METASTASIS

1.- General information

Code	303025	Plan		ECTS	3
Type	Elective	Course	2021/2022	Periodicity	1 st Semester
Department	Cancer Research Center				
Virtual Platform	Platform:	CICLOUD			
	URL de Acces:	http://cicloud.dep.usal.es/index.php/s/Gp0vghR305Y6glo/authenticate			
Language	This subject is taught in English				

Faculty

Professor Coordinator	Dr. Miguel Vicente Manzanares				
Research area	Biofísica tumoral				
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				
Center	Cancer Research Center				
Office	Laboratory 2				
URL Web	https://www.cicancer.org/investigador?id=9d1e7abf-ab43-4b20-8f59-2ddf6a6aecd				
Tutorials	Appointment by email				
E-mail	jrobles@usal.es	Phone	923 294720 Ext:4802		

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

Professional specialization

Master Degree on Health Sciences

3.- Previous recommendations

No prior requirements

4.- Aims of the subject

This subject is a graduate-level, comprehensive perspective 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 major aim will be a critical and integrated approach to learning classic and modern techniques, including the most recent approaches to study migration in vivo, will be applied to the study of cell adhesion, motility and migration. In addition, the student should acquire skills in the critical analysis of the scientific literature through discussion workshops of articles and experiments related to the module, practical demonstrations. Lectures, evaluations and student presentations will be carried out in English to develop the integration of the students in 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 motion generation 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 metástasis in solid tumors.

ONLINE ONLY CONTENT

Principles of microscopy (2h in three lectures)

6.- Skills to be acquired

Basic skills

- Knowledge and fact-gathering.
- Topic preparation, literature gathering, exposition (in English), question solving in a seminar format.
- Knowledge acquisition and question resolution.

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 a professor.

- 1.- There will be 10 lectures of 2 hours for the Introduction of the course, the theoretical presentations and the exam (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 ($2 \times 2 = 4$ hours). The students will devote 6 hours to the preparation of each article. 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 ($1 \times 2 = 2$ hours), and additional off-site time (up to a maximum of 75h total, including the hours described above) should be devoted to the study the provided materials, resolve 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	12			12
Other activities			20	20
Exams - evaluation	2		10	12
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
Evaluation of debate participation and critical understanding of the articles/experiments that are discussed in the workshops (35%), and exam (65%).
Recommendations