



Universitat de Lleida

DEGREE CURRICULUM
**MOLECULAR PATHOLOGY AND
THERAPEUTICS**

Coordination: SANCHIS MORALES, DANIEL

Academic year 2021-22

Subject's general information

Subject name	MOLECULAR PATHOLOGY AND THERAPEUTICS			
Code	14700			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Master's Degree in Biomedical Research	1	COMMON	Attendance-based
Course number of credits (ECTS)	4			
Type of activity, credits, and groups	Activity type	TEORIA		
	Number of credits	4		
	Number of groups	1		
Coordination	SANCHIS MORALES, DANIEL			
Department	BASIC MEDICAL SCIENCES			
Teaching load distribution between lectures and independent student work	40 hours master class 60 hours student's work			
Important information on data processing	Consult this link for more information.			
Language	English Catalan Spanish			
Distribution of credits	40 hours Lectures in a single group			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
ARANGO DEL CORRO, DIEGO	diego.arango@irbllleida.udl.cat	1	
DOLCET ROCA, FRANCESC XAVIER	xavi.dolcet@udl.cat	,4	
RIBAS FORTUNY, JUDIT	judit.ribas@udl.cat	,4	
SANCHIS MORALES, DANIEL	daniel.sanchis@udl.cat	1,2	
SEGURADO GOUVEIA, MARIA LEONOR	leonor.segurado@udl.cat	1	

Learning objectives

1. The development of an integrative and molecular view of prominent human diseases.
2. The performance of translational approaches, diagnostic, prognostic or therapeutic based on the molecular mechanisms involved.

Competences

Basic

CB1 Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context (*)

CB2 Know how to apply the knowledge acquired and have the ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study (*)

CB3 Being able to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and

CB4 Know how to communicate their conclusions –and the knowledge and ultimate reasons that support them– to specialized and non-specialized audiences in a clear and unambiguous way (*)

CB5 Possess the learning skills that allow them to continue studying in a way that will have to be largely self-directed or autonomous (*)

General

CG1 Know how to choose and apply the different methodologies of molecular, biochemical, cellular, genetic and

phenotypic analysis for the diagnosis and study of diseases.

CG4 Capacity for critical and creative thinking with their work and that of other researchers

Specific

CE3 Identify and assess the implications of the phenomenon of cell death in the genesis of multiple diseases and the rational bases for the derived therapeutics

CE4 Recognize high throughput techniques and be able to use bioinformatics tools for data analysis.

Transversal

CT1 Have a correct oral and written expression

CT4 Respect the fundamental rights of equality between men and women, the promotion of Human Rights and the values of a culture of peace and democratic values

Subject contents

Content:

1. Current trends in cancer research (Diego Arango, IRBLLEIDA)

Hallmarks of cancer: Sustained proliferation and evading growth suppression

Hallmarks of cancer: replicative immortality and resisting cell death

Personalized treatment of cancer

Common experimental approaches in cancer research

Introduction to public repositories and online resources for cancer research

2a. Molecular and cellular mechanisms of cancer progression (Xavi Dolcet, IRBLLEIDA)

Steps cancer progression

Cell invasion and metastasis

Types of cell invasion

The epithelial-to-mesenchymal-transition in mesenchymal invasion.

2b. Modelling cancer in vivo and in vitro

In vitro study of cancer.

Modeling oncogenesis in 3D cultures

Animal models in cancer biology. Mouse models of cancer

New approaches in cancer modelling: the CRISPR/Cas9 gene edition system

3. Vascular Pathobiology (Leonor Segurado, IRBLLEIDA-IR Josep Carreras)

Principles of development, organization and function of the vasculature

Vascular Biology in health and disease

Tools to study vascular biology: Experimental models and emerging technology

Tumor angiogenesis

Therapeutic strategies targeting the vasculature.

4. Heart disease: understanding pathology and therapeutics from basic biology (Daniel Sanchis, IRBLLEIDA)

Biology of the heart

Response of cardiomyocytes to cell stress

Critical revision of available experimental models

Molecular and Cellular therapeutics for heart failure.

5. Neuromuscular diseases caused by mitochondrial dysfunction (Ramon Martí, VHIR)

Genetics, pathomechanisms and diagnostic of mitochondrial diseases:

Mitochondrial genetics

Main clinical features

Diagnostic tools

Study models and therapy approaches for mitochondrial diseases:

In vitro and in vivo models

Experimental therapies under investigation

6. Genomics applied to neurodegenerative diseases (Agustín Ruiz, ACE)

Basic fundamentals of genomics and neurodegenerative processes.

Alzheimer's disease as a model: an overview of the identified loci and their usefulness to improve diagnosis and treatment.

From the sentinel marker to the molecular mechanism: Meta-analysis, integrative analysis and identification of pathological processes.

7. Therapeutic strategies against SARS-CoV2 (Judit Ribas, IRBLLEIDA)

Introduction. Differences between SARS, MERS and COVID-19. SARS-CoV-2 Viral replication cycle.

Disease Pathophysiology. SARS-CoV-2 variants.

Treatment: prophylactic vaccination and viral variant-sensitivity.

New Potential therapeutic agents.

Methodology

Lectures. See development plan for further information

The official calendar/schedule of the course will be followed.

Development plan

The content is worked on in 2-hour sessions with the full group following the schedule set by the Master's coordinator. Each teacher uses the tools they think are optimal for the presentation and work on the subject.

Evaluation

- Attendance and active participation will provide the 40% of the course mark. Each unjustified nonattendance will imply the loss of a 2%.
- There will be test exam (date indicated in the calendar). The exam will be based on the subjects addressed and the training taught. It will provide the 60% of the course evaluation mark. An alternative evaluation procedure will be proposed and announced conveniently, if COVID-19 pandemic requires avoiding personal assistance to the classroom..

Bibliography

Specific and general bibliography will be provided. Students will get PDF files related to the subjects approached in the course by connecting to their master folders in the UdL network.