



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Biomedicina, Neuroscienze e Diagnostica avanzata		
ACADEMIC YEAR	2021/2022		
MASTER'S DEGREE (MSC)	MEDICAL BIOTECHNOLOGIES AND MOLECULAR MEDICINE		
SUBJECT	THEORY AND APPLICATIONS OF CELL MODELS		
TYPE OF EDUCATIONAL ACTIVITY	B		
AMBIT	50644-Discipline biotecnologiche comuni		
CODE	19390		
SCIENTIFIC SECTOR(S)	BIO/13		
HEAD PROFESSOR(S)	ALESSANDRO RICCARDO	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	102		
COURSE ACTIVITY (Hrs)	48		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	ALESSANDRO RICCARDO Monday 15:00 18:00 Via Divisi 83 Friday 15:00 18:00 Via Divisi 83		

DOCENTE: Prof. RICCARDO ALESSANDRO

PREREQUISITES	The student should know: 1) the structure of nucleic acids and proteins; 2) the main processes regulating cell life (replication, transcription, protein synthesis) 3) The main methods for the study of the molecular mechanisms used by the cells for gene expression (electrophoresis, western blot, PCR, etc)
LEARNING OUTCOMES	Knowledge and understanding skills - Acquisition of the specific language used in the study of Cellular and Molecular Biotechnologies; - Knowing and evaluating the technological applications of some genome modification methods. Knowing and understanding the concepts of stem cells and cell lineage; - Understanding the genetic and cellular bases of some biological processes such as Angiogenesis; - Understanding the genetic, epigenetic and cellular bases of some human pathologies; - Knowing the molecular mechanisms underlying the processes of RNA interference; - Knowing and understanding the molecular mechanisms of some particular types of intercellular communication (esosomes, connections etc.). Ability to apply knowledge and understanding Ability to distinguish, organize and apply autonomously: - the knowledge of biological processes underlying the phenomenon of RNA interference; - the knowledge of alterations of specific signal transduction mechanisms underlying tumor angiogenesis; - Autonomy of judgment To be able to independently evaluate and integrate: - the implications of genome modifications on the cell phenotype and how these can help to understand cell biology - the implications of molecular alterations of the biological processes on human pathologies development . Communication skills Ability to communicate and illustrate, in a simple way, also to a general audience, the processes of biology and cellular and molecular biotechnology that regulate cellular functioning. Learning capability Ability to properly use the specific scientific bibliography of the field for a continuous updating of biotechnology and biomedical knowledge. Ability to learn and follow suitably, using the knowledge obtained in the course, the next classes of the curriculum for the degree in Medical Biotechnology and Molecular Medicine.
ASSESSMENT METHODS	contextual assessment of the knowledge of curriculum content (written test or oral exam) and the report on the activities' carried out during laboratories training. It will be possible to do two different tests: a written test with 25 questions with multiple choices and two open questions. The student has the possibility to accept the proposed grade or he/she can refuse and access to an oral exam. Objective of the written test of the duration of 90 minutes is to verify the possession of disciplinary skills and knowledge gained during the course. The questions tend to verify a) the knowledge gained, and b) the ability of elaborative and synthesis skills. As for the assessment of knowledge, it will be required the ability to contextualize the topic within a specific cellular process illustrating the properties and characteristics of the molecule and / or biological activity. As for the verification of the elaborative abilities, it will be evaluated the ability to extrapolate the minimum details of the process in a clear and concise manner and the understanding of their implications for the topic. Each question with multiple choice will receive a score of 1 while the open question will get a maximum vote of 3. The oral test consists of a conversation usually lasting 20-30 minutes in order to check the knowledge of the topics of the course. Final vote will be expressed according the following scheme: 30-30 e Lode: A-A+ Excellent 27-29: B Very good 24-26: C Good 21-23: D Satisfactory 18-20: E Sufficient 1-17: F Fail
EDUCATIONAL OBJECTIVES	To Know and understand the genome-changing technologies (Knock out mice; Crisp Cas; Conditional Mutants); Understand the molecular and cellular processes underlying the angiogenetic process as well as its alterations in specific pathologies; Understanding the molecular processes that lead to RNA interference; Understanding and illustrating intercellular communication modes; Understand the modulating genetic mechanisms of Long non-coding RNA.
TEACHING METHODS	Lessons in the classrooms, lessons in the laboratories
SUGGESTED BIBLIOGRAPHY	"BIOLOGIA MOLECOLARE della CELLULA" B. Alberts et al., Ed. Zanichelli, 2016 - ISBN: 9788808621269; "BIOLOGIA CELLULARE e MOLECOLARE " G. Karp, Ed. EdiSES, 2015 - ISBN 9788879598637; REVIEW SU NATURE, NATURE MEDICINE, SCIENCE, Articoli vari

SYLLABUS

Hrs	Frontal teaching
4	Introduction to stem cell: embryonic and adult stem cells
3	The endothelial growth factors: structure and signal transduction mechanisms
3	In vitro and in vivo experimental systems to study the angiogenetic process;
2	Endothelial cell precursors and their use in therapeutic approaches
3	Tumor angiogenesis
4	RNA interference: siRNA and miRNA;

SYLLABUS

Hrs	Frontal teaching
2	Long Non Coding RNA
3	Intercellular communication systems;
4	Exosomes and their role in intercellular communication;
4	In vivo systems for genome modification (Knock out mice, Crisp-Cas System , Conditional Mutants)
Hrs	Practice
22	Discussion of research projects.
22	Critical discussion on scientific articles related to the topics discussed during the course with related laboratory activities.