UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Biomedicina, Neuroscienze e Diagnostica avanzata		
ACADEMIC YEAR	2016/2017		
MASTER'S DEGREE (MSC)	MEDICAL BIOTECHNOLOGIESD AND MOLECULAR MEDICINE		
INTEGRATED COURSE	CELLULAR BIOTECHNOLOGIES AND EPIGENOMICS - INTEGRATED COURSE		
CODE	15108		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	BIO/13, BIO/10		
HEAD PROFESSOR(S)	ALESSANDRO RICCARDO	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)	ALESSANDRO RICCARDO	Professore Ordinario	Univ. di PALERMO
	DI LIEGRO ITALIA	Professore a contratto in quiescenza	Univ. di PALERMO
CREDITS	9		
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 **DI LIEGRO ITALIA** Monday 10:00 12:00 Caltanissetta, CEFPAS, padiglione 3, o Palazzo Moncada. Wednesday 15:00 17:00 Palermo, Viale delle Scienze, Edificio 16 (STEBICEF) Thursday 15:00 17:00 Palermo, Viale delle Scienze, Edificio 16 (STEBICEF) Friday 15:00 17:00 Palermo, Viale delle Scienze, Edificio 16 (STEBICEF)		

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 ability 'to understand - Acquisition of the specific language of the Cellular and Molecular Biotechnology disciplines; - Know and understand the biochemical mechanisms underlying epigenetic processes and proteomic technologies; - Know and understand the concepts of stem cell 'and cell lineage; - Know and understand the genetic and cellular basis of certain biological processes such as angiogenesis; - Know and understand the genetic basis, epigenetic and cell phones of some major human diseases or widespread; - Knowing the molecular mecanismi she underlie the processes of interference RNA; - Know and understand the principles that govern specific types of intercellular communication (exosomes, connexin etc) Capacity 'to apply knowledge and understanding Capacity 'to differentiate, organize and implement, independently: - Knowledge of the biological processes underlying the phenomenon of RNA interference; - Knowledge about the alterations of specific signal transduction mechanisms of tumor angiogenesis; - Capacity 'to distinguish and apply the main methods of proteomics. Making judgments Being able to evaluate and integrate, in an autonomous manner: - The application of proteomics more 'appropriate for the study of a particular biological process and / or to a particular disease; - -the Implications they have on human diseases alterations of biological processes at the base of cell life. Enable 'communication Ability 'to communicate and explain, in a simple, even a non-expert audience, the processes of biology and cellular and molecular biotechnology that regulate the functioning of the cells. Learning ability Ability 'to properly use the scientific literature specific industry for continuous updating of knowledge in biotechnology and biomedicine. Capacity 'to learn and follow appropriately, using the knowledge acquired in the course, the subsequent teaching courses 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
TEACHING METHODS	Lessons in the classrooms, lessons in the laboratories

MODULE
THEORY AND APPLICATIONS OF CELL MODELS

Prof. RICCARDO ALESSANDRO

SUGGESTED BIBLIOGRAPHY

"BIOLOGIA MOLECOLARE della CELLULA" B. Alberts et al., Ed. Zanichelli, 2015
"BIOLOGIA CELLULARE e MOLECOLARE " G. Karp, Ed. EdiSES, 2015
REVIEW SU NATURE, NATURE MEDICINE, SCIENCE, Articoli vari

AMBIT	50636-Discipline di base applicate alle biotecnologie
INDIVIDUAL STUDY (Hrs)	75
COURSE ACTIVITY (Hrs)	75

EDUCATIONAL OBJECTIVES OF THE MODULE

Understanding the molecular and cellular processes underlying the angiogenic process as well as its alterations in specific diseases; Understanding the molecular processes that lead to RNA interference ;
Understand and explain the intercellular communication;

SYLLABUS

Hrs	Frontal teaching
4	Introduction to the concept of stem cell: embryonic and adult stem cells
3	The endothelial growth factors: structure and mechanisms of signal transduction
2	The experimental systems in vitro and in vivo to study the angiogenic process;
2	Precursors of endothelial cells and their use for therapeutic approaches
3	Tumoral Angiogenesis
3	RNA interference; siRNA and miRNA
3	Overview on mechanisms of intercellular communication
3	Exosomes and their role in intercellular communication

Hrs	Practice
20	Discussion on research projects
20	Critical Discussion of scientific papers on the topic discussed during the course and related laboratory experience

MODULE
BIOCHEMICAL MECHANISMS OF EPIGENETIC PROCESSES

Prof.ssa ITALIA DI LIEGRO

SUGGESTED BIBLIOGRAPHY

Articoli sperimentali e sommari (reviews) scientifici pubblicati su riviste a diffusione internazionale.

Updated original research papers and review papers published in international journals.

AMBIT	20885-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	42
COURSE ACTIVITY (Hrs)	33

EDUCATIONAL OBJECTIVES OF THE MODULE

Knowing and understanding the basic concepts of epigenetics. Knowing and understanding the mechanisms underlying post-translational modifications of histone proteins (i.e.acetylation, methylation, phosphorylation, ubiquitination, etc), and DNA methylation. Knowing and understanding the biochemical inter-relationships between the environment and the genome.

SYLLABUS

Hrs	Frontal teaching
2	Historical introduction to the concept of epigenetics
2	Organization of eukaryotic chromatin
2	Covalent modifications of histone proteins (acetylation, methylation, phosphorylation, ubiquitination, ADP-ribosylation, etc.) and enzymes involved. Regulatory proteins that recognize post-translationally modified histones in chromatin: histone code.
3	Methylation and demethylation of DNA enzymes involved and functions. CpG islands. 5-mC e 5-hmC. Imprinting. Inactivation of X chromosome.
2	ATP-dependent chromatin remodeling complexes. Mechanisms of chromatin remodeling. Histone chaperones."Pioneer" transcription factors.
2	Histone variants.Histone variant expression in developing mammalian brain.
4	Biochemical methods for the study of epigenetic phenomena.Matrix Assisted Laser Dissorption Ionization - Time of Fly (MALDI-TOF). Differential display.Stable Isotope Labeling by/with Amino acids in Cell culture (SILAC) for highlighting of proteins differentially expressed under different physiological (or pathological) conditions. Chromatographic techniques. Production of recombinant proteins and their use for fishing interactors. Genome studies: Immuno-fluorescence and FISH. Chromatin immuno-precipitation (ChIP).
2	Non-coding RNAs and their roles in epigenetic processes. RNA binding proteins (RBPs) and their role in the regulation of mRNA metabolism: control of stability, translation and pre-localization of mRNAs in developing organisms and in polarized, differentiated cells. Special aspects of RBPs/ mRNAs interactions in both nerve and glial cells of the nervous system.
2	Model systems for the study of epigenetic processes (yeast, fungi , ciliates)
3	Epigenetic memory. Cloning experiments. Stem cells. Tissue engineering. Induction of pluripotent stem cells (iPSC).