



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Medicina di Precisione in area Medica, Chirurgica e Critica		
ACADEMIC YEAR	2022/2023		
MASTER'S DEGREE (MSC)	DENTISTRY		
INTEGRATED COURSE	BIOLOGY AND GENETICS - INTEGRATED COURSE		
CODE	01617		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	BIO/13		
HEAD PROFESSOR(S)	FONTANA SIMONA	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)	FONTANA SIMONA	Professore Associato	Univ. di PALERMO
	PUCCI MARZIA	Ricercatore a tempo determinato	Univ. di PALERMO
CREDITS	9		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	FONTANA SIMONA Thursday 15:30 16:30 Dipartimento di Biomedicina, Neuroscienze e Diagnostica avanzata, Sezione di Biologia e Genetica - Via Divisi, 83. A causa di possibili altri impegni istituzionali o riunioni di lavoro potrebbe non essere possibile ricevere gli studenti nel giorno e alle ore indicate. Per questo è preferibile comunque fissare un appuntamento via e-mail.		
	PUCCI MARZIA Monday 15:00 17:00 Dal lunedì al venerdì, previo appuntamento, via Divisi 83, Palermo.		

PREREQUISITES	The student must have basic knowledge of chemistry in order to be able to understand the mode of interaction of molecules within the cell. The chemical properties of water; the different types of chemical bonds as well as the main classes of biological macromolecules (sugars, lipids, proteins and nucleic acids) are topic to be known.
LEARNING OUTCOMES	<p>Knowledge and understanding</p> <ul style="list-style-type: none">- Acquisition of the specific language of Biology and Genetics topics;- to Know and understand the basic biological processes of living organisms and the way in which hereditary characteristics are transmitted to the offsprings;- to know and understand the genetic basis of the most common human diseases or those diseases with an high incidence in the territory. <p>Applying knowledge and understanding</p> <p>Ability to distinguish, organize and implement, in a independent way:</p> <ul style="list-style-type: none">- the knowledge of basic biological processes of cells and organisms;- the laws which regulate the transmission of hereditary characteristics in living species;- the main methods of cell biology and molecular genetics. <p>Making judgments</p> <p>Being able to evaluate and integrate, in an autonomous manner:</p> <ul style="list-style-type: none">- the acquired knowledge in biology and genetics in the study of organisms and in particular man;-the consequences of the alterations of biological processes on human diseases. <p>Communication skills</p> <p>Ability to communicate and explain, in a simple way, even to a non-expert public, the biological and genetic processes.</p> <p>Learning ability</p> <p>Ability to properly use the scientific literature for a continuous update of knowledge in the biomedical field.</p> <p>Ability to learn and follow appropriately, using the knowledge acquired in thecourse, the subsequent teaching courses of the curriculum for the final degree in Medicine and Surgery.</p>
ASSESSMENT METHODS	<p>There will be two tests: an ongoing evaluation constituted by 6 open writtwn questions and an oral examination at the end of the course.</p> <p>Objective of the ongoing evaluation of the duration of 90 minutes and to verify the possession of disciplinary skills and knowledge gained after conducting more than a third of the program. 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 will receive a score from 0 to IV with IV the highest score and 0 the lowest score. The evaluation scheme is the following:</p> <p>0 - less than 18: insufficient knowledge of the contents required by the specific question or the student does not answer;</p> <p>I - 18/20 vote: minimum basic knowledge of the subject requested and poor elaborative capacity;</p> <p>II - vote 21/24: just enough knowledge of the subject, and limited language abilities;</p> <p>III - 25/27 vote: good knowledge of the issues and good language abilities; the student is able to correlate the different topics which has studied</p> <p>IV - 28/30 vote: more than good acquisition of the course content and excellent language abilities and synthesis abilities</p> <p>The oral test consists of a conversation usually lasting 20-30 minutes in order to check the knowledge of the topics of the course related to the remaining two thirds of the program. The final Evaluation will also consider the assessment reached in the ongoing evaluation.</p> <p>Final vote will be expressed according the following scheme:</p> <p>30/30 e Lode: A-A+ Excellent</p> <p>27/29: B Very good</p> <p>24/26: C Good</p> <p>21/23: D Satisfactory</p> <p>18/20: E Sufficient</p> <p>1/17: F Fail</p>

	<p>The final evaluation is calculated as the average of the scores given in the two tests.</p> <p>If will not possible for sanitary conditions or other reasons to perform a written test, the final test will be only oral on the whole program.</p>
TEACHING METHODS	Lessons in presence, on line or in both ways depending on procedures indicated by the University of Palermo.

MODULE GENERAL AND APPLIED BIOLOGY

Prof.ssa MARZIA PUCCI

SUGGESTED BIBLIOGRAPHY

"BIOLOGIA E GENETICA" G. De Leo, E. Ginelli, S. Fasano, Ed. EdiSES, 2020
 "MOLECOLE, CELLULE E ORGANISMI" E. Ginelli, M. Malcovati Ed EdiSES, 2016
 "BIOLOGIA CELLULARE E MOLECOLARE" G. Karp EdiSES ed V
 LE SCIENZE (Ed. ital. Scientific American), NATURE, SCIENCE, BIOLOGICAL REVIEWS, Articoli vari

AMBIT	50443-Discipline generali per la formazione dell'odontoiatra
INDIVIDUAL STUDY (Hrs)	90
COURSE ACTIVITY (Hrs)	60

EDUCATIONAL OBJECTIVES OF THE MODULE

Identify the main biological structures, the organization and functioning of a eukaryotic cell;
 Distinguish viruses, prokaryotic and eukaryotic cells;
 Analyze and compare the flow of genetic information in haploid organisms and in diploid organisms.
 Interpret the mechanisms of gene expression in prokaryotes and eukaryotes;
 Interpret the mechanisms of cellular interactions, gene regulation, cell differentiation and "planning" of development.
 Interpret and use scientific methodology and recognize different biomedical technologies

SYLLABUS

Hrs	Frontal teaching
4	Scientific Method The cellular Theory; Classification of organisms; Notes on Evolution of species; The Prokariotic and Eukariotic Cell; The main classes of biological macromolecules.
2	Cytomembranes, organization and functional examples.
6	The genetic material, experimental identification and genetic value of nucleic acids. Composition and structure of nucleic acids; DNA replication.
4	Organization of DNA in eukaryotic chromosomes, the structural hierarchy of the chromatin material: Structure of genes. Mitochondrial DNA.
7	Messenger RNA, ribosomal RNA, transfer RNA and other non coding RNAs: structures and functions.
3	The genetic code.
6	"Transcription" in prokaryotes and eukaryotes cells; nucleolar organizer and ribosome biogenesis; Processing and Differential splicing of RNA.
5	Protein synthesis in prokaryotes and eukaryotes cells.
4	Regulation of gene expression in prokaryotes.
4	Regulation of gene expression in eukaryotes; Main transcriptional regulation mechanisms during the process of differentiation; Role of non coding RNA.
5	Cell Cycle, Mitosis. Meiosis Gametogenesis.
2	Cell Death mechanisms: necrosis and apoptosis.
4	Embryonic development and cell differentiation, nuclear totipotency and Cloning; Development models development and homeotic genes.
4	Stem cells and their use in regenerative medicine.

MODULE GENERAL AND APPLIED GENETICS

Prof.ssa SIMONA FONTANA

SUGGESTED BIBLIOGRAPHY

"BIOLOGIA E GENETICA" G. De Leo, E. Ginelli, S. Fasano, Ed. EdiSES, 2013
 "EREDITA': PRINCIPI E PROBLEMATICHE DELLA GENETICA UMANA" M.R. Cummings, Ed. EdiSES, Terza edizione 2014
 LE SCIENZE (Ed. ital. Scientific American), NATURE, SCIENCE, BIOLOGICAL REVIEWS, Articoli vari

AMBIT	50443-Discipline generali per la formazione dell'odontoiatra
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30

EDUCATIONAL OBJECTIVES OF THE MODULE

Identify the main biological structures, the organization and functioning of a eukaryotic cell;
 Distinguish viruses, prokaryotic and eukaryotic cells;
 Analyze and compare the flow of the genetic information in the virus, in haploid organisms and in diploid organisms.
 Interpret the mechanisms of gene expression in prokaryotes and eukaryotes;
 Interpret the mechanisms of cellular interactions, gene regulation, cell differentiation and "planning" of development.
 Interpret and use scientific methodology and recognize different biomedical technologies

SYLLABUS

Hrs	Frontal teaching
7	Variability and mutation, molecular mechanisms and biological relevance, meiosis as a genetic mixer. Somatic and germinal mutations. DNA polymorphisms and mutations. Mechanisms of mutations onset, DNA repair, relation with human pathologies, cell aging and cancer. Chromosome and genomic mutations, cause of occurrence.
4	Methods of gene analysis, restriction endonucleases, vectors for cloning and expression, DNA cloning, polymerase chain reaction; DNA sequencing; Genome Project: opportunities and risks; gene therapy: genome editing, immunotherapy and cell therapy; overview on -omics Sciences: meaning and biomedical applications.
5	Formal and human genetics, genotype and phenotype, diploidy and sex, Mendel and his experiments, intermediate heredity, recessive and dominant, linkage
7	Examples of genetic transmission in humans. genotype-phenotype relationship. Analysis of mono and polygenic traits. hereditary enzymatic deficiencies, co-dominant phenotype, multi-loci heterogeneity, allelic heterogeneity, cytoplasmatic heterogeneity, quantitative traits, and multifactorial traits, multiple alleles, epistasis, variability in genetic expression, expressivity, penetrance, role of environment and its incidence, background of population genetics, Imprinting and epigenetic heredity.
4	Genetic basis of sex, sex determination in animal species, X- and traits in Drosophila and in humans, gene dosage and Lyonization, Y-linked traits in humans
3	Human karyotype, chromosome banding, Methods of in situ hybridization (FISH), international representation of karyotype, genotype representation, genealogical trees, genetic counseling and prenatal diagnosis, probability in human genetics, applications of genetics in medicine, molecular methods for diagnosis of genetic diseases, forensic examples