



# UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Medicina di Precisione in area Medica, Chirurgica e Critica		
ACADEMIC YEAR	2019/2020		
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)	SEIDITA GREGORIO	Ricercatore	Univ. di PALERMO
OTHER PROFESSOR(S)	SEIDITA GREGORIO	Ricercatore	Univ. di PALERMO
	CORRADO CHIARA	Professore Associato	Univ. di PALERMO
CREDITS	9		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	<p><b>CORRADO CHIARA</b>  Wednesday 15:00 17:00 Dip. DiBiMed, Sez. di Biologia e Genetica -via Divisi 83, 90133 Palermo chiara.corrado@unipa.it</p> <p><b>SEIDITA GREGORIO</b>  Tuesday 14:30 16:30 Sezione di Biologia e Genetica via divisi, 83 (Dipartimento di Biopatologia e Biotecnologie Mediche)  Wednesday 11:00 13:00 Sezione di Biologia e Genetica via divisi, 83 (Dipartimento di BiND)</p>		

<b>PREREQUISITES</b>	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.
<b>LEARNING OUTCOMES</b>	<p>Knowledge and understanding</p> <ul style="list-style-type: none"> <li>- Acquisition of the specific language of the disciplines of Biology and Genetics;</li> <li>- Know and understand the basic biological processes of living organisms and the way in which hereditary characteristics are transmitted to the generations;</li> <li>- Know and understand the genetic basis of some major human diseases, the most common ones and those with a high incidence in the territory.</li> </ul> <p>Applying knowledge and understanding</p> <p>Ability to differentiate, organize and implement, independently:</p> <ul style="list-style-type: none"> <li>- Knowledge of basic biological processes of cells and organisms;</li> <li>- The laws which regulate the transmission of hereditary characteristics in living species;</li> <li>- The main methods of cell biology and molecular genetics.</li> </ul> <p>Making judgments</p> <p>Being able to evaluate and integrate, in an autonomous manner:</p> <ul style="list-style-type: none"> <li>- The acquired knowledge in biology and genetics in the study of organisms and in particular man;</li> <li>- the Implications they have on human diseases alterations of biological processes at the base of cell life.</li> </ul> <p>communication skills</p> <p>Ability to communicate and explain, in a simple, even a non-expert public, biology and genetic processes.</p> <p>Learning ability</p> <p>Ability to properly use the industry-specific scientific literature for a continuous updating of knowledge in the biomedical field.</p> <p>Ability to learn and follow appropriately, using the knowledge acquired in the course, the subsequent teaching courses of the curriculum for a degree in Dentistry and Dental Implants.</p>
<b>ASSESSMENT METHODS</b>	<p>The Learning evaluation is done by oral examination. During the year an ongoing test is held with Biology topics. The outcome of the evaluation is expressed by a vote ranging from 1-30. The oral exam consists of a conversation usually lasting about 20-30 minutes in order to check the disciplinary knowledge of the curriculum contents. In the assessment of learning it is taking into account the participation and evaluation obtained of test carried out during the course.</p> <p>The following table shows the learning evaluation scheme with the ECTS grades, the equivalent rating of thirty and their significance.</p> <p>ECTS gradeItalian GradeGrade descriptors</p> <p>A – A+ / Excellent 30/30 cum laude Excellent knowledge of teaching contents; students should show high analytical and synthetic capabilities and should be able to apply their knowledge to solve highly complex problems.</p> <p>B / Very good 27-29/30 Very good knowledge of the teaching contents and excellent language control; students should show analytical and synthetic skills and be able to apply their knowledge to solve problems of medium and, in some cases, even higher complexity.</p> <p>C / Good 24- 26/30 Good knowledge of teaching contents and good language control; the students should be able to apply their knowledge to solve problems of medium complexity</p> <p>D / Satisfactory 21-23/30 Average knowledge of the teaching contents, in some cases limited to the main topic; acceptable ability to use the specific discipline language and independently apply the acquired knowledge.</p> <p>E / Sufficient 18-20</p>

	<p>Minimum teaching content knowledge, often limited to the main topic; modest ability to use the subject specific language and independently apply the acquired knowledge.</p> <p>F / Fail</p> <p>Lack of an acceptable knowledge of the main teaching content knowledge; very little or no ability to use the specific subject language and apply independently the acquired knowledge.</p> <p>During the lessons there will be an on-going test lasting 90 minutes whose participation is optional. The on-going test will be structured in two parts: a first part with 28 multiple choice questions, each with 4 or 5 answer options (only one is correct). Each correct question has the score of 1, every incorrect or unspecified question has the score of zero. The second part will include two open questions with a score ranging from 0 (worst) to 2 (best). The evaluation of learning in the ongoing test will be expressed in judgment (from insufficient to excellent). THE on-going test (with a judgment equal to or greater than sufficient) will be evaluated as an integral part of the exam.</p> <p>The aim of the on-going test is to verify disciplinary skills and knowledge achieved. The questions will tend to verify a) the acquired knowledge and b) the processing and synthesis skills. Regarding the verification of knowledge, the ability to contextualize the topic within a specific cellular process will be required, illustrating the properties and characteristics of the molecule and / or biological activity.</p> <p>The learning evaluation scheme in the on-going test is the following:</p> <p>1-17 = INSUFFICIENTE  18-21 = SUFFICIENTE  22-24 = DISCRETO  25- 27 = BUONO  28-30 = OTTIMO</p> <p>The validity of the on-going test extends to the session immediately following that of the end of the course (September session).</p>
<b>TEACHING METHODS</b>	Lessons in the classroom; practical lessons and exercises

## MODULE GENERAL AND APPLIED GENETICS

*Prof. GREGORIO SEIDITA*

### SUGGESTED BIBLIOGRAPHY

- Thompson e Thompson Genetica in Medicina, (2018) ed. Edises [solo Genetica]
- De Leo, Ginelli, Fasano. (2014) Biologia e genetica. Edizioni Edises; [Biologia e Genetica]
- \* il Thompson e' alternativo al De Leo (per la parte di Genetica)
- Tom Strachan, Andrew Read. (2012) Genetica molecolare umana. Zanichelli editore. [per approfondimento Genetica molecolare]

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

### EDUCATIONAL OBJECTIVES OF THE MODULE

At the end of the course students should have achieved autonomy in understanding the different modes of transmission of hereditary characters. They must be able to construct and analyze family trees and to be able to use the knowledge acquired during the course to give genetic counseling regarding dental pathologies.

## SYLLABUS

Hrs	Frontal teaching
2	Variability and mutation, somatic and germline mutations; Mutations and DNA polymorphisms; Chromosomal and genomic mutations and their origin.
2	Genetics of Viruses and Prokaryotes, The organization of prokaryotic genomes, plasmids and episomes.
6	Formal genetics and human genetics, genotype and phenotype relationship. Diploidy and sexuality. Gregor Mendel and the Principles of Inheritance, Mendelian concept of "dominant" and "recessive"; The linkage disequilibrium, the associated characters. The Punnett square.
6	Examples of inherited traits in humans: transmission and genotype-phenotype relationship. Comparison of mono- and polygenic characters; co-dominant Phenotypes; Multi-locus Genetic heterogeneity, inherited enzyme deficiencies; Allelic heterogeneity; cytoplasmic inheritance; Distinction between genetic and hereditary diseases. Inheritance of quantitative traits and multifactorial; multiple alleles; Epistasis. Variability of gene expression; Variable expressivity and incomplete penetrance, incidence of environmental factors; Population genetics.
4	Genetic basis of sex determination in animals and Humans; Heritage associated with sex: diagnosis in <i>Drosophila</i> and in the Human; gene dosage and Lyonizzazione; Olandric Inheritance human species.
3	Human karyotype: chromosome banding; Techniques of in situ hybridization (FISH); Array CGH; international terminology for the representation of the karyotype. formal graphic representation of the genotypes. family tree study. Genetic counseling and prenatal diagnosis. Applications of Genetics in Medicine: Molecular technologies for the diagnosis; use of polymorphisms associated with mutations for molecular diagnosis of genetic diseases; Forensic Genetics.
3	Methods of analysis of the gene sequence, restriction endonucleases, Vectors for gene expression and amplification; Synthesis and cloning of cDNA; Polymerase chain reaction (PCR); Analysis of DNA polymorphisms. Use of DNA polymorphisms in prenatal diagnosis and in Forensic Genetics.
Hrs	Practice
4	Family Trees and risk of recurrence training. Main database of gene sequences. Portal NCBI.

## MODULE GENERAL AND APPLIED BIOLOGY

*Prof.ssa CHIARA CORRADO*

### SUGGESTED BIBLIOGRAPHY

"BIOLOGIA E GENETICA" G. De Leo, E. Ginelli, S. Fasano, Ed. EdiSES, 2013  
 "MOLECOLE, CELLULE ED ORGANISMI", Ginelli S. Malcovati M., Ed. EdiSES, 2017  
 LE SCIENZE (Ed. ital. Scientific American), NATURE, SCIENCE, BIOLOGICAL REVIEWS, Articoli vari

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

### EDUCATIONAL OBJECTIVES OF THE MODULE

The Cell Biology Course will introduce students to key concepts of cellular and molecular processes regulating prokaryotic and eukaryotic cell activities. At the end of the course each student will have to display:

- 1.to distinguish viruses, prokaryotic and eukaryotic cells;
- 2.to identify the main biological structures, the organization and functioning of a eukaryotic cell;
- 3.to well know mechanisms of DNA replication, transcription, translation;
- 4.to know structure of genes and chromosomes, cell-cycle control system and cell division.
- 5.to interpret the mechanisms of gene expression in prokaryotes and eukaryotes;
- 6.to interpret the mechanisms of cellular interactions, gene regulation, cell differentiation.

## SYLLABUS

Hrs	Frontal teaching
4	Scientific Method. The cellular Theory. Characteristics and classification of living organisms. Prokaryotic cell and eukaryotic cell. Biological macromolecules. Chemical physical properties of water and its interactions with biological macromolecules.
2	cellular membranes, organization and functional examples
6	The genetic material. experimental identification and genetic value of nucleic acids. composition and structure of nucleic acids; DNA replication.
2	genome of virus, prokaryotes and eukaryotes. nuclear and mitochondrial DNA. reproduction of living organisms.
3	genetic code and its properties
7	Messenger RNA, ribosomal RNA and transfer RNA: structures and functions.
6	"Transcription" in prokaryotes and eukaryotes cells; nucleolar organizer and ribosome biogenesis; Processing of RNAs.
5	Protein structures and functions. protein synthesis in prokaryotes and eukaryotes cells.
4	organization of eukaryotic DNA; structural hierarchies of chromatin material; genes structure.
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 noncoding RNA
3	transduction signaling: general mechanisms and examples.
4	Cell cycle, mitosis and meiosis. Gametogenesis. Sexual reproduction.
2	Cell Death mechanisms: necrosis and apoptosis. autophagy. molecular mechanisms and alteration during pathologies.
4	Embryonic development and cell differentiation. Nuclear totipotency and cloning. Development models and homeotic genes. Stem cells.