



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Biomedicina, Neuroscienze e Diagnostica avanzata		
<b>ACADEMIC YEAR</b>	2023/2024		
<b>BACHELOR'S DEGREE (BSC)</b>	BIOMEDICAL LABORATORY TECHNIQUES		
<b>INTEGRATED COURSE</b>	BIOLOGY AND GENETICS - INTEGRATED COURSE		
<b>CODE</b>	01618		
<b>MODULES</b>	Yes		
<b>NUMBER OF MODULES</b>	2		
<b>SCIENTIFIC SECTOR(S)</b>	BIO/13, MED/46		
<b>HEAD PROFESSOR(S)</b>	SEIDITA GREGORIO	Ricercatore	Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	GAGGIANESI MIRIAM	Ricercatore a tempo determinato	Univ. di PALERMO
	SEIDITA GREGORIO	Ricercatore	Univ. di PALERMO
<b>CREDITS</b>	6		
<b>PROPAEDEUTICAL SUBJECTS</b>			
<b>MUTUALIZATION</b>			
<b>YEAR</b>	1		
<b>TERM (SEMESTER)</b>	1° semester		
<b>ATTENDANCE</b>	Mandatory		
<b>EVALUATION</b>	Out of 30		
<b>TEACHER OFFICE HOURS</b>	<p><b>GAGGIANESI MIRIAM</b>            Tuesday 14:30 16:30 Dipartimento Discipline Chirurgiche Oncologiche e Stomatologiche. Laboratorio di fisiopatologia cellulare e molecolare- Via del vespro 131- Presso Dermatologia (primo piano).</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>		

DOCENTE: Prof. GREGORIO SEIDITA

<b>PREREQUISITES</b>	Students must have basic notions of chemistry and biology.
<b>LEARNING OUTCOMES</b>	<p>Knowledge and understanding:</p> <p>Acquisition of the specific language of the disciplines of Biology and Genetics; Know the basics of the cellular organization of living organisms; know and understand basic biological processes such as growth, cell division, sexual reproduction and embryonic development; the mechanisms of replication and variability of the genetic material; the main mechanisms of gene expression, the genetic basis of heredity and the methods of transmission of hereditary characteristics.</p> <p>Ability to apply knowledge and understanding:</p> <p>Ability to autonomously recognize and apply the knowledge of the basic biological processes of cells and organisms; the laws governing the transmission of hereditary characteristics,</p> <p>Autonomy of judgment:</p> <p>Being able to independently evaluate and integrate the knowledge acquired in biology and genetics in the study of organisms and in particular of man; the implications that the alterations of biological processes have on human pathologies</p> <p>Communication skills:</p> <p>Ability to explain in a simple way and communicate clearly, the main processes of biology, genetics to interact with the medical staff.</p> <p>Learning ability:</p> <p>Ability to update knowledge in the biomedical field by consulting the scientific bibliography specific to the sector of competence; Ability to learn and follow suitably, using the knowledge acquired in these disciplines, the subsequent teachings of the curriculum of this course of study. Ability to deepen the topics also by attending specific courses or seminars or 1st level Masters.</p>
<b>ASSESSMENT METHODS</b>	<p>The evaluation of the student includes an oral test consisting of an interview that will focus on all the topics of the program, with reference to the recommended texts and the teaching material produced by the teacher. At least three questions are proposed during the interview. The interview is aimed at evaluating the "knowledge" and "know-how" acquired by the student, and to ascertain: a) the knowledge acquired in the disciplines and the ability to establish connections between the contents b) the processing skills demonstrated by the understanding of the applications and of the implications of the contents within the professional context c) the expository skills manifested in possessing adequate properties of language and ability to interact with the examiners.</p> <p>The final evaluation is a mark out of thirty and is assigned according to the following scheme:</p> <p>VOTE 30-30 and praise. Evaluation: Excellent (ECTS grade A-A + Excellent) Outcome = full possession of the teaching contents; the student demonstrates synthetic-analytical skills and is able to apply knowledge even in detail in order to solve complex problems; full command of the language of the sector. VOTE 27-29 - Evaluation: Excellent (ECTS grade B Very good). Outcome: excellent knowledge of the teaching contents; the student demonstrates analytical-synthetic ability and ability to apply knowledge to solve problems of medium complexity and, in some cases, even high; excellent language property appropriate to the professional context</p> <p>VOTE 24-26 - Evaluation: Good (ECTS grade C Good). Outcome: good knowledge of the teaching content; the student demonstrates the ability to apply knowledge to solve problems of medium complexity; good language property</p> <p>VOTE 21-23- Evaluation: Fair (ECTS grade D Satisfactory). Outcome: fair knowledge of the teaching contents, in some cases limited to the main topics; acceptable ability to use the specific language of the discipline and modest ability to independently apply the acquired knowledge</p> <p>VOTE 18-20- Evaluation: Sufficient (ECTS grade E Sufficient). Outcome: minimal knowledge of the teaching contents, often limited to the main topics; modest ability to use the specific language of the discipline which is not sufficiently articulated; minimal ability to autonomously apply the acquired knowledge</p> <p>VOTE 1-17- Evaluation: Insufficient (ECTS grade F Fail). Outcome: the student does not have a knowledge of the main teaching contents; very little or no ability</p>

	to use the specific language of the discipline and to independently apply the acquired knowledge. Failed exam
<b>TEACHING METHODS</b>	Frontal lessons with the aid of multimedia presentations.

<b>MODULE</b> <b>BIOLOGY AND GENETICS</b> <i>Prof. GREGORIO SEIDITA</i>	
<b>SUGGESTED BIBLIOGRAPHY</b>	
P. Bonaldo, Crisafulli C., D'Angelo R., Francolini M., Grimaudo S., Rinaldi C., Riva P., Romanelli M.G. Elementi di Biologia e Genetica Edises (2019) ISBN 9788833190389;	
<b>AMBIT</b>	10338-Scienze biomediche
<b>INDIVIDUAL STUDY (Hrs)</b>	45
<b>COURSE ACTIVITY (Hrs)</b>	30
<b>EDUCATIONAL OBJECTIVES OF THE MODULE</b>	
Understanding the biological organization that underlies living organisms. Know the fundamental biological processes of molecular biology. Knowing the processes of expression of the activity of genes and the methods of transmission of hereditary traits.	

### SYLLABUS

Hrs	Frontal teaching
2	Living organism concept. The cell: structural and functional organization. Differences between eukaryotic, prokaryotic and virus
4	Chemical composition of living matter; Biological macromolecules; Proteins: structure and function. Biological membranes
2	Nucleic acids: structure and function; DNA as a genetic material; Main classes of RNA in eukaryotes.
2	DNA duplication in prokaryotes and eukaryotes.
3	Expression of genetic information, Transcription The maturation of primary transcripts in eukaryotes.
4	Genetic code; ribosome structure and translation: translation initiation, elongation and termination phases
2	Chromatin and Chromosomes; Cell cycle and Mitosis.
2	Meiosis and Gametogenesis of the human species; Sexual reproduction; Elements of developmental biology
3	Variability and Mutation; Mutations meaning and occurrence; DNA repair mechanisms; Gene mutations, chromosomal mutations and tumors; Genomic mutations
6	Formal genetics; Mendel and his experiments; Extensions of the Mendelian inheritance; Inheritance of dominant and recessive autosomal traits of the human species: significant examples of normal and pathological traits; Heredity associated with sex chromosomes; Biological basis of hereditary pathologies

**MODULE**  
**BASIC TECHNICAL SCIENCES OF LABORATORY MEDICINE**

*Prof.ssa MIRIAM GAGGIANESI*

**SUGGESTED BIBLIOGRAPHY**

Biotechnologie molecolari - Principi e tecniche  
Terry A. Brown, 2017 Zanichelli  
ISBN: 9788808320964

<b>AMBIT</b>	10341-Scienze e tecniche di laboratorio biomedico
<b>INDIVIDUAL STUDY (Hrs)</b>	45
<b>COURSE ACTIVITY (Hrs)</b>	30

**EDUCATIONAL OBJECTIVES OF THE MODULE**

Acquisition of the fundamental notions in the field of recombinant DNA technologies for diagnostics applications. The student will acquire competences on nucleic acid purification, agarose gel electrophoresis, PCR, real time PCR and basic molecular biology techniques (restriction enzymes, expression vectors) and their applications in the production of recombinant proteins, drugs and monoclonal antibodies.

**SYLLABUS**

<b>Hrs</b>	<b>Frontal teaching</b>
5	Extraction, purification and quantification of nucleic acid.
2	DNA electrophoresis and methods for analyzing DNA.
2	Enzymology: enzyme classification, general enzyme properties, enzymatic activity dosage in diagnostic.
5	Polymerase chain reaction (PCR): general principles and applications, primer design, PCR cloning. Demonstrations of PCR mix preparation. pcr diagnostic applications (paternity test, diagnosis of infectious diseases, hiv, mutation study, expression biology, genetic analysis ). analysis of pcr data, types of diagnostic pcr (long pcr, nested pcr, inverse pcr, quantitative pcr, hot start pcr), reverse transcriptase.
5	real-time PCR, general principles and applications, two-steps PCR versus one-step PCR, florescent dyes absorption / emission spectrum), fret, instruments, pcr dyes (sybr green, taqman, hairpin probes, hybridization probes), threshold, $\Delta\Delta\text{ct}$ methods, relative quantification, standard curve and absolute quantification, melting curve. Real-time pcr diagnostic applications (pathogen study, snps genotyping, high resolution melting, methylation analysis).
5	DNA sequencing: difference between Maxam Gilbert and Sanger sequencing. DNA sequencing diagnostic applications.
2	DNA cloning: bases of gene cloning in cells, restriction enzymes and DNA ligase functions. Demonstrations of restriction enzyme cutting.
2	Plasmids and vectors, bacterial transformation protocols, screening of colonies and isolation of nucleic acid from bacteria.
2	Methods for the production of recombinant proteins: vectors, expression systems of recombinant proteins, examples of therapeutic use; production of monoclonal antibodies.