UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche
ACADEMIC YEAR	2019/2020
BACHELOR'S DEGREE (BSC)	BIOLOGICAL SCIENCES
SUBJECT	GENETICS WITH PRACTICE
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50027-Discipline biomolecolari
CODE	13842
SCIENTIFIC SECTOR(S)	BIO/18
HEAD PROFESSOR(S)	LENTINI LAURA Professore Associato Univ. di PALERMO DI LEONARDO ALDO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	149
COURSE ACTIVITY (Hrs)	76
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**DI LEONARDO ALDO** Friday 14:30 16:00 Studio docente, dipartimento STEBICEF, viale delle Scienze, Ed.16 piano -1 **LENTINI LAURA** Thursday 15:00 17:00 Sede del Consorzio Universitario, corso Vittorio Emanuele, 92, 93100 Caltanissetta Friday 11:00 13:00 Studio docente e Aula Microsoft Teams Dip. STEBICEF, viale delle Scienze, Ed.16 , piano -1.

DOCENTE: Prof. ALDO DI LEONARDO- *Lettere A-K*

PREREQUISITES	Knowledge of the main concepts of cell biology (meiosis, mitosis, etc.) and mathematics.
LEARNING OUTCOMES	Knowledge and understanding: understanding of theoretical and operational elements relating to the mechanisms of heredity working in several species Applying knowledge and understanding: acquisition of methodological, technological and instrumental skills to perform genetic analyses. Making judgments: acquisition of independent judgment with respect to the evaluation and interpretation of experimental data and concepts contained in scientific texts. Communication skills: acquisition of adequate know-how of fundamental experiments of classical and molecular genetics and their contribution to current genetic knowledge. Learning ability: being able to solve genetics exercises employing different organisms from those generally used in genetic texts.
ASSESSMENT METHODS	The evaluation will be made by oral test and written exercises. The assessment will take into account the level of knowledge of the topics treated during the course and skills reasoning demonstrated during the examination. In detail: Insufficient- the student does not possess the basic knowledge of genetic terms and concepts. 18-21- limited knowledge of basic genetic topics (eg: transmission of Mendelian traits etc.) associated with fragmentary and incomplete exposure or missed resolution of exercises. 22-25- mastery of only basic issues associated with discrete scientific language abilities, discrete ability to solve problems regarding classical/bacterial genetics. 26-29- more than good grasp of the topics covered in the course, ability to solve classical/bacterial genetic problems, full of scientific language. 30-30 laude- excellent mastery and ability to present the topics of both Classical and molecular genetics, demonstrating excellent reasoning skills for the resolution of the proposed problems, good mastery of scientific language.
EDUCATIONAL OBJECTIVES	The goal of the course is to help the students to uncover and make connections among the main concepts of genetics. The course is aimed to provide: i. a solid knowledge of the principles of inherited characteristics, the rules of genetic traits transmission and a good competence of the methods and technologies related to genetics; ii. an adequate preparation to understand the scientific and technological advances aimed to know topics associated with the inheritance of genetics traits.
TEACHING METHODS	Class lectures on all topics of the course. Practical experience of cytogenetic techniques.
SUGGESTED BIBLIOGRAPHY	Snustad Simmons, Genetica. Ed. EdiSES, Napoli. Anthony J.F. Griffiths et al. Genetica, principi di analisi formale. Ed. Zanichelli. P.J.Russel, Genetica, un approccio molecolare. Ed. Pearson

SYLLABUS

Hrs	Frontal teaching
12	MENDELIAN GENETICS- Mendel's method to study transmission of genetic traits. Mendel's laws. dominance and recessiveness of genetic traits. Test cross. Phenotypic ratios of monohybrid and dihybrid crosses. Extension of Mendelian genetics: co-dominance, incomplete dominance, multiple alleles, allelic series. Genes interaction. Epistasis. Resolution of exercises dealing with genetics crosses.
4	The chromosomal basis of heredity: Morgan experiments. Sex-linked Heredity. Sex determination in Drosophila and humans. Sex-related genes in humans. Genetic analysis of human pedigrees. resolution of exercises.
6	Linked genes: backcross experiments. Frequency of recombination. Linkage and crossing over. Using the recombination frequency for the construction of genetic maps. Three-point test cross. Interference and coefficient of coincidence. Resolution of exercises.
8	The chemical nature of the genetic material and its organization in chromosomes. Griffith and Hershey & Chase experiments. The process of DNA replication. Transcription and translation of genetic information. The genetic code.
4	Structure and function of chromosomes. Chomosomal structural mutations, genomic changes: aneuploidy, polyploidy.
8	Spontaneous and induced mutations. Classification of genetic mutations and mechanism for their generation. Point mutations: transitions and transversions. Alkylating agents and base analogs as point mutation inducers. Ames' Test. Mechanisms of DNA repair. Transposable elements.

SYLLABUS

Hrs	Frontal teaching
8	Genetic analysis of bacteria and bacteriophages (gene mapping). Conjugation, transformation and transduction to map E.coli chromosome. E. coli strains (HFR) and genetic mapping. Mixed infection (double infection) and genetic mapping of bacteriophages. The T4 rII locus (Benzer S. experiments).
6	Regulation of gene expression in prokaryotes: inducible operon (Lac operon) and repressible operon (Trp operon). Attenuation of Trp operon. Resolution of exercises.
6	DNA recombinant technology. Vectors for cloning. restriction enzymes; Southern, Northern and Western techniques. DNA sequencing. Polymorphisms and principles of forensic genetics. RNA interference.
2	Genetic bases of cancer: oncogenes and tumor suppressor genes.

Hrs	Practice
12	Preparation of metaphase spreads from cultured cells for subsequent cytogenetics analyses.

DOCENTE: Prof.ssa LAURA LENTINI- *Lettere L-Z*

PREREQUISITES	Knowledge of the main concepts of cell biology (eg: gametogenesis, meiosis, mitosis, etc.) and mathematics.
LEARNING OUTCOMES	Knowledge and understanding: understanding of theoretical and operational elements relating to the mechanisms of heredity working in several species. Applying knowledge and understanding: acquisition of methodological, technological and instrumental skills to perform genetic analyses. Making judgments: acquisition of independent judgment with respect to the evaluation and interpretation of experimental data and concepts contained in scientific texts. Communication skills: acquisition of adequate know-how of fundamental experiments of classical and molecular genetics and their contribution to current genetic knowledge. Learning ability: Being able to solve genetics exercises employing different organisms from those generally used in genetic texts.
ASSESSMENT METHODS	The evaluation will be made by oral test and written exercises. The assessment will take into account the level of knowledge of the topics treated during the course and skills reasoning demonstrated during the examination. In detail: Insufficient- the student does not possess the basic knowledge of genetic terms and concepts. 18-21- limited knowledge of basic genetic topics (eg: transmission of Mendelian traits etc.) associated with fragmentary and incomplete exposure or missed resolution of exercises. 22-25- mastery of only basic issues associated with discrete scientific language abilities, discrete ability to solve problems regarding classical/bacterial genetics. 26-29- more than good grasp of the topics covered in the course, ability to solve classical/bacterial genetic problems, full of scientific language. 30-30 laude- excellent mastery and ability to present the topics of both Classical and molecular genetics, demonstrating excellent reasoning skills for the resolution of the proposed problems, good mastery of scientific language.
EDUCATIONAL OBJECTIVES	The goal of the course is to help the students to uncover and make connections among the main concepts of genetics. The course is aimed to provide: i. a solid knowledge of the principles of inherited characteristics, the rules of genetic traits transmission and a good competence of the methods and technologies related to genetics; ii. an adequate preparation to understand the scientific and technological advances aimed to know topics associated with the inheritance of genetics traits.
TEACHING METHODS	Class lectures on all topics of the course. Practical experience of cytogenetic techniques.
SUGGESTED BIBLIOGRAPHY	Snustad Simmons, Genetica IV edizione. Ed. EdiSES, Napoli. Anthony J.F. Griffiths et al. Genetica, principi di analisi formale. Ed. Zanichelli.

SYLLABUS

Hrs	Frontal teaching
12	MENDELIAN GENETICS- Mendel's method to study transmission of genetic traits. Mendel's laws. dominance and recessiveness of genetic traits. Test cross. Phenotypic ratios of monohybrid and dihybrid crosses. Extension of Mendelian genetics: co-dominance, incomplete dominance, multiple alleles, allelic series. Genes interaction. Epistasis. Resolution of exercises dealing with genetics crosses.
4	The chromosomal basis of heredity: Morgan experiments. Sex-linked Heredity. Sex determination in Drosophila and humans. Sex-related genes in humans. Genetic analysis of human pedigrees. resolution of exercises.
6	Linked genes: backcross experiments. Frequency of recombination. Linkage and crossing over. Using the recombination frequency for the construction of genetic maps. Three-point test cross. Interference and coefficient of coincidence. Resolution of exercises.
8	The chemical nature of the genetic material and its organization in chromosomes. Griffith and Hershey & Chase experiments. The process of DNA replication. Transcription and translation of genetic information. The genetic code.
4	Structure and function of chromosomes. Chomosomal structural mutations, genomic changes: aneuploidy, polyploidy.
8	Spontaneous and induced mutations. Classification of genetic mutations and mechanism for their generation. Point mutations: transitions and transversions. Alkylating agents and base analogs as point mutation inducers. Ames' Test. Mechanisms of DNA repair. Transposable elements.
8	Genetic analysis of bacteria and bacteriophages (gene mapping). Conjugation, transformation and transduction to map E.coli chromosome. E. coli strains (HFR) and genetic mapping. Mixed infection (double infection) and genetic mapping of bacteriophages. The T4 rII locus (Benzer S. experiments).
6	Regulation of gene expression in prokaryotes: inducible operon (Lac operon) and repressible operon (Trp operon). Attenuation of Trp operon. Resolution of exercises.
6	DNA recombinant technology. Vectors for cloning. restriction enzymes; Southern, Northern and Western techniques. DNA sequencing. Polymorphisms and principles of forensic genetics. RNA interference.

SYLLABUS

Hrs	Frontal teaching
2	Genetic bases of cancer: oncogenes and tumor suppressor genes.

Hrs	Practice
12	Preparation of metaphase spreads from cultured cells for subsequent cytogenetics analyses.