Anno Accademico **2021/2022**
Scuola **Medicina e Chirurgia**
Classe **LM-9-BIOTECNOLOGIE MEDICHE, VETERINARIE E FARMACEUTICHE**
Corso **9081-MEDICAL BIOTECHNOLOGY**

Primo Anno di Corso

Gruppo: Compulsory learning activities

TAF: **Ambito:**

Cfu min: **Cfu max:**
Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ.	VER.
9081 000 000 90927 - 1 - ADVANCED HUMAN GENETICS (I.C.)				10			Voto
Modulo integrato: 90929 - CLASSICAL AND NEXT-GENERATION GENOMICS		BIO/13		5	32/0/15/0	No	

Ambito: 044 - Discipline biotecnologiche comuni B

Obiettivi: Discuss the structure, organization, variability, genetic information and gene families of the human genome.
Critically appraise the rational basis of the main molecular and computational biology methods used for the study of genomes, including both classical and next-generation approaches.
Consult and study bibliographic sources to self-update on innovative genomic topics and techniques.
Use common software tools for genetics and genomics, and apply them to the biomedical field.

Obiettivi inglese: Discuss the structure, organization, variability, genetic information and gene families of the human genome.
Critically appraise the rational basis of the main molecular and computational biology methods used for the study of genomes, including both classical and next-generation approaches.
Consult and study bibliographic sources to self-update on innovative genomic topics and techniques.
Use common software tools for genetics and genomics, and apply them to the biomedical field.

Modulo integrato: 81594 - MEDICAL GENOMICS-		MED/03		5	32/0/15/0	No	

Ambito: 610 - Medicina di laboratorio e diagnostica B

Obiettivi: Identify the major categories of inherited diseases, the genetic mechanisms contributing to disease etiology, and their inheritance patterns.
Describe strategies to identify the genetic causes of inherited diseases.
Discuss the use of genomic data and technology in the management of inherited diseases.
Discuss innovations in human genomic research and their applications in medicine.
Critically evaluate research articles pertinent to medical genomics.

Obiettivi inglese: Identify the major categories of inherited diseases, the genetic mechanisms contributing to disease etiology, and their inheritance patterns.
Describe strategies to identify the genetic causes of inherited diseases.
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Discuss innovations in human genomic research and their applications in medicine.
Critically evaluate research articles pertinent to medical genomics.

9081 000 000 91660 - 1 - ANATOMICAL AND PHYSIOLOGICAL BASES OF ORGAN PATHOLOGIES (I.C.) 10 Voto

Modulo integrato: 90922 - ANATOMY BIO/16 5 40/0/0/0 No

Ambito: 620 - Morfologia, funzione e patologia delle cellule e degli organismi complessi B

Obiettivi: Identify the major components and topography of the central and peripheral nervous systems.
Correlate the anatomy of the nervous system with its function and pathologies.
Identify the major components and topography of the genitourinary and reproductive systems.
Identify the major endocrine glands of the body and summarize their role in the body.

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Correlate the anatomy of the nervous system with its function and pathologies.
Identify the major components and topography of the genitourinary and reproductive systems.
Identify the major endocrine glands of the body and summarize their role in the body.

Modulo integrato: 76149 - PHYSIOLOGY BIO/09 5 32/0/15/0 No

Ambito: 044 - Discipline biotecnologiche comuni B

Obiettivi: Identify the morphology and function of specific organs and apparatuses of biotechnological interest in the context of clinical applications.
Correlate concepts of integrative physiology of the human organism with pathophysiology.
Select and interpret scientific data relevant to physiology and pathophysiology.

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Correlate concepts of integrative physiology of the human organism with pathophysiology.
Select and interpret scientific data relevant to physiology and pathophysiology.

9081 000 000 90932 - 1 - BIOMOLECULAR BASIS OF ANATOMICAL PATHOLOGY MED/08 6 40/0/15/0 No Voto

Ambito: 610 - Medicina di laboratorio e diagnostica B

Obiettivi: Discuss the principal epidemiologic, morphologic, phenotypic, clinicopathologic features, and etiopathogenesis of common neoplastic and non neoplastic disorders, focusing on cardiovascular and neuromuscolar disorders.
Describe the methods used to process and analyze tissue samples for diagnostic Anatomic Pathology, including histopathology and ultrastructural laboratory instrumentation and devices.
Discuss innovative technologies for early diagnosis of disease, and for the identification of new molecular targets for tumor therapies.

Obiettivi inglese: Discuss the principal epidemiologic, morphologic, phenotypic, clinicopathologic features, and etiopathogenesis of common neoplastic and non neoplastic disorders, focusing on cardiovascular and neuromuscolar disorders.
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9081 000 000 90937 - 1 - BIOMOLECULAR BASIS OF ORGAN PATHOLOGIES (I.C.) 11 Voto

Modulo integrato: 69887 - ENDOCRINOLOGY MED/13 3 24/0/0/0 No

Ambito: 1144 - Attivita' formative affini o integrative C

Obiettivi: Describe the molecular basis of endocrine systems and the pathogenesis of endocrine diseases.
Discuss the development and application of novel technological strategies for the diagnosis and therapy of endocrinological disesases in the daily clinical practice.
Critically read and interpret scientific literature in the field of endocrinology and metabolism.

Obiettivi inglese: Describe the molecular basis of endocrine systems and the pathogenesis of endocrine diseases.
Discuss the development and application of novel technological strategies for the diagnosis and therapy of endocrinological disesases in the daily clinical practice.
Critically read and interpret scientific literature in the field of endocrinology and metabolism.

Modulo integrato: 69883 - NEPHROLOGY | MED/14 | 3 | 24/0/0/0 | No

Ambito: 1144 - Attivita' formative affini o integrative C

Obiettivi: Describe the normal architecture and function of the renal parenchyma, and the molecular and cellular etiopathogenesis of the main nephrological diseases.
Discuss the main diagnostic techniques for the identification of diseases with renal involvement.
Discuss innovative biotechnological strategies for the diagnosis and therapy of renal disorders.
Apply molecular biology techniques for the study of nephrological problems.

Obiettivi inglese: Describe the normal architecture and function of the renal parenchyma, and the molecular and cellular etiopathogenesis of the main nephrological diseases.
Discuss the main diagnostic techniques for the identification of diseases with renal involvement.
Discuss innovative biotechnological strategies for the diagnosis and therapy of renal disorders.
Apply molecular biology techniques for the study of nephrological problems.

Modulo integrato: 65226 - INTERNAL MEDICINE | MED/09 | 5 | 24/0/30/0 | No

Ambito: 1176 - Discipline medico-chirurgiche e riproduzione umana B

Obiettivi: Describe the pathophysiological bases of human diseases with specific emphasis on oncological, degenerative metabolic and immunological conditions, focusing on cellular and molecular etiopathogenetic mechanisms of clinical relevance;
Identify pathological conditions in which biotechnological approaches are already of clinical relevance;
Select and interpret information in order to collaborate with medical practitioners in designing and applying biotechnological diagnostic and therapeutic strategies;
Plan, implement and develop potential applications of biotechnology in the field of Internal Medicine, in order to operate in biomedical research

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Identify pathological conditions in which biotechnological approaches are already of clinical relevance;
Select and interpret information in order to collaborate with medical practitioners in designing and applying biotechnological diagnostic and therapeutic strategies;
Plan, implement and develop potential applications of biotechnology in the field of Internal Medicine, in order to operate in biomedical research

9081 000 000 90926 - 1 - EMERGING MOLECULAR BIOLOGY IN HEALTH AND DISEASE | BIO/11 | 6 | 48/0/0/0 | No | Voto

Ambito: 044 - Discipline biotecnologiche comuni B

Obiettivi: Describe general overviews on stem cell biology
Identify the most important solutions and problems arising from some of the most advanced views in cellular signaling, genome function and cellular reprogramming.
Identify when progression in basic and translational research can effectively match unmet clinical needs
Discuss the mechanisms underlying cell growth and differentiation, with particular reference to the modulation of gene expression, epigenetics, nuclear dynamics and signaling.
Critically explain the future perspectives in Regenerative and Precision Medicine.
Evaluate the most updated publications within the context of Molecular and Cellular Biology, with particular emphasis to mechanisms underlying cellular commitment and adaptation, reprogramming, and differentiation.

Obiettivi inglese: Describe general overviews on stem cell biology
Identify the most important solutions and problems arising from some of the most advanced views in cellular signaling, genome function and cellular reprogramming.
Identify when progression in basic and translational research can effectively match unmet clinical needs
Discuss the mechanisms underlying cell growth and differentiation, with particular reference to the modulation of gene expression, epigenetics, nuclear dynamics and signaling.
Critically explain the future perspectives in Regenerative and Precision Medicine.
Evaluate the most updated publications within the context of Molecular and Cellular Biology, with particular emphasis to mechanisms underlying cellular commitment and adaptation, reprogramming, and differentiation.

9081 000 000 76168 - 1 - MOLECULAR ONCOLOGY AND IMMUNOPATHOLOGY | MED/04 | 6 | 48/0/0/0 | No | Voto

Ambito: 044 - Discipline biotecnologiche comuni B

Obiettivi: Describe the transformed phenotype and its molecular and cellular basis, the pathogenesis of cancer, including the interactions with the microenvironment and the immune system, and molecular cancer progression up to the metastatic diffusion.
Identify the phases of development and the tumor types relevant to human oncology and define molecular targets for innovative targeted therapies.
Discuss the pathogenetic mechanisms of the main immune pathologies (immunodeficiencies, allergy, autoimmunity), as well as the role of the immune system in the natural and vaccine-elicited immunity to infectious agents, cell and organ transplants, and cancer.

Obiettivi inglese: Describe the transformed phenotype and its molecular and cellular basis, the pathogenesis of cancer, including the interactions with the microenvironment and the immune system, and molecular cancer progression up to the metastatic diffusion.

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Discuss the pathogenetic mechanisms of the main immune pathologies (immunodeficiencies, allergy, autoimmunity), as well as the role of the immune system in the natural and vaccine-elicited immunity to infectious agents, cell and organ transplants, and cancer.

9081 000 000 90933 - 1 - NORMAL AND LEUKEMIC STEM CELLS (I.C.)			10		Voto
Modulo integrato: 90935 - STEM CELL THERAPY	BIO/17		4	24/0/15/0	No

Ambito: 1144 - Attivita' formative affini o integrative C

Obiettivi: Identify and discuss stem cell features, molecular mechanisms of differentiation and possible applications related to regenerative medicine.
Recognise the characteristics of embryonic stem cells and those of the adult stem cells.
Describe the methods for stem cell isolation to obtain progenitor cells from extraembryonic tissues.

Obiettivi inglese: Identify and discuss stem cell features, molecular mechanisms of differentiation and possible applications related to regenerative medicine.
Recognise the characteristics of embryonic stem cells and those of the adult stem cells.
Describe the methods for stem cell isolation to obtain progenitor cells from extraembryonic tissues.

Modulo integrato: 90936 - MOLECULAR BASIS OF HAEMATOLOGICAL DISORDERS	MED/15		3	16/0/15/0	No

Ambito: 1144 - Attivita' formative affini o integrative C

Obiettivi: Describe the biological properties of the hematopoietic stem cells and relevant biotechnological applications.
Describe the phenotype and genotype of hematological malignancies.
Discuss the principles of targeted therapy and cell therapy with particular reference to the transplantation of stem cells and regenerative medicine.
Define the molecular targets and cellular structures suitable for the development of new forms of targeted therapy.
Critically evaluate new diagnostic and therapeutic approaches in hematology.

Obiettivi inglese: Describe the biological properties of the hematopoietic stem cells and relevant biotechnological applications.
Describe the phenotype and genotype of hematological malignancies.
Discuss the principles of targeted therapy and cell therapy with particular reference to the transplantation of stem cells and regenerative medicine.
Define the molecular targets and cellular structures suitable for the development of new forms of targeted therapy.
Critically evaluate new diagnostic and therapeutic approaches in hematology.

Modulo integrato: 90934 - HUMAN EMBRIOLOGY	BIO/17		3	16/0/15/0	No

Ambito: 1144 - Attivita' formative affini o integrative C

Obiettivi: Describe the mechanisms that control embryogenesis and morphogenesis in relation to human abnormalities and malformations.
Discuss the mechanisms underlying embryonic processes focusing on recent discoveries that have shed light on traditional concepts or raised new doubts.
Critically evaluate issues related to embryonic and adult stem cells.
Describe the methods for stem cell isolation to obtain progenitor cells from perinatal tissues.

Obiettivi inglese: Describe the mechanisms that control embryogenesis and morphogenesis in relation to human abnormalities and malformations.
Discuss the mechanisms underlying embryonic processes focusing on recent discoveries that have shed light on traditional concepts or raised new doubts.
Critically evaluate issues related to embryonic and adult stem cells.
Describe the methods for stem cell isolation to obtain progenitor cells from perinatal tissues.

Secondo Anno di Corso

Gruppo: Compulsory learning activities

TAF: Ambito:

Cfu min: Cfu max:
Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ.	VER.

9081 000 000 82287 - 2 - TIROCINIO 4 0/0/100/0 No Voto

Ambito: 1146 - Tirocini formativi e di orientamento F

9081 000 000 90941 - 2 - INNOVATIVE MEDICAL THERAPIES (I.C.) 10 Voto

Modulo integrato: 76211 - GENE THERAPY MED/04 5 40/0/0/0 No

Ambito: 044 - Discipline biotecnologiche comuni B

Obiettivi: Define the main technologies of gene transfer and compare them in terms of therapeutic approaches, efficiency and safety.
Explain inherited and acquired diseases that could benefit from gene therapy.
Discuss the regulatory aspects related to gene therapy.
Choose the gene therapy approach that fits each disease, and evaluate its advantages and disadvantages.
Critically evaluate features, innovation, safety of reports on gene therapy studies.
Keep up-to-date on rules, methods, technologies and devices, through scientific literature, gene therapy websites and data banks.

Obiettivi inglese: Define the main technologies of gene transfer and compare them in terms of therapeutic approaches, efficiency and safety.
Explain inherited and acquired diseases that could benefit from gene therapy.
Discuss the regulatory aspects related to gene therapy.
Choose the gene therapy approach that fits each disease, and evaluate its advantages and disadvantages.
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Modulo integrato: 69888 - PHARMACOLOGY BIO/14 5 40/0/0/0 No

Ambito: 412 - Discipline farmaceutiche B

Obiettivi: Identify key parameters for risk/benefit assessment of drug therapies.
Understand sources of variability in clinical drug responses (including pharmacogenomics).
Describe the basic methodology of pre-clinical and clinical drug trials, their regulatory and ethical implications, and procedures for marketing authorization, with special reference to biotechnological drugs.
Present therapeutic options (conventional and biotech drugs) in the context of a given disease, highlighting innovative aspects.
Critically evaluate research articles presenting pre-clinical and clinical data, through consultation of specific databases and documentation provided online by regulatory agencies.

Obiettivi inglese: Identify key parameters for risk/benefit assessment of drug therapies.
Understand sources of variability in clinical drug responses (including pharmacogenomics).
Describe the basic methodology of pre-clinical and clinical drug trials, their regulatory and ethical implications, and procedures for marketing authorization, with special reference to biotechnological drugs.
Present therapeutic options (conventional and biotech drugs) in the context of a given disease, highlighting innovative aspects.
Critically evaluate research articles presenting pre-clinical and clinical data, through consultation of specific databases and documentation provided online by regulatory agencies.

9081 000 000 90939 - 2 - LABORATORY DIAGNOSTICS (I.C.) 10 Voto

Modulo integrato: 76209 - CLINICAL MICROBIOLOGY MED/07 5 40/0/0/0 No

Ambito: 044 - Discipline biotecnologiche comuni B

Obiettivi: Define the general characteristic of bacteria, viruses, protozoa, fungi and helminths
Describe the routes of transmission for infections of medical importance
Discuss the establishment of host-parasite interaction
Describe the basic concept of prophylaxis and antimicrobial and antiviral therapy, including mechanism of drug resistance
Describe characteristics, pathogenesis, and clinical aspects for bacteria, viruses, protozoa, fungi and helminths of medical relevance
Recognize and discuss the clinical meaning of microbiological findings within the diagnosis of infectious diseases

Obiettivi inglese: Define the general characteristic of bacteria, viruses, protozoa, fungi and helminths
Describe the routes of transmission for infections of medical importance
Discuss the establishment of host-parasite interaction
Describe the basic concept of prophylaxis and antimicrobial and antiviral therapy, including mechanism of drug resistance
Describe characteristics, pathogenesis, and clinical aspects for bacteria, viruses, protozoa, fungi and helminths of medical relevance
Recognize and discuss the clinical meaning of microbiological findings within the diagnosis of infectious diseases

Modulo integrato: 90940 - CLINICAL LABORATORY DIAGNOSTICS MED/05 5 32/0/15/0 No

Ambito: 610 - Medicina di laboratorio e diagnostica B

Obiettivi: Describe the theoretical and methodological bases of cytology, cytopathology, immunohematology and genetic pathology.
Discuss the application of cellular and molecular methodological approaches to the diagnostic process in human pathology.
Interpret the results of diagnostic laboratory tests for the characterisation of major human disorders.

Obiettivi inglese: Describe the theoretical and methodological bases of cytology, cytopathology, immunohematology and genetic pathology.
Discuss the application of cellular and molecular methodological approaches to the diagnostic process in human pathology.
Interpret the results of diagnostic laboratory tests for the characterisation of major human disorders.

9081 000 000 90938 - 2 - NEUROMETABOLIC AND NEURODEGENERATIVE DISORDERS (I.C.) 9 Voto

Modulo integrato: 65155 - NEUROLOGY MED/26 4 32/0/0/0 No

Ambito: 1144 - Attivita' formative affini o integrative C

Obiettivi: Define the bio-molecular bases of neuronal physiology with particular reference to protein and mitochondrial metabolism Discuss the molecular and cellular etiopathogenesis of the main neurodegenerative, autoimmune and mitochondrial encephalopathies Describe examples of molecular-phenotypic correlations in the field of neurodegenerative diseases Critically evaluate the main molecular and biochemical techniques for the in vivo and post-mortem diagnosis of both genetic and sporadic diseases of the nervous system Apply molecular biology techniques to the study of neurological problems.

Obiettivi inglese: Define the bio-molecular bases of neuronal physiology with particular reference to protein and mitochondrial metabolism Discuss the molecular and cellular etiopathogenesis of the main neurodegenerative, autoimmune and mitochondrial encephalopathies Describe examples of molecular-phenotypic correlations in the field of neurodegenerative diseases Critically evaluate the main molecular and biochemical techniques for the in vivo and post-mortem diagnosis of both genetic and sporadic diseases of the nervous system Apply molecular biology techniques to the study of neurological problems.

Modulo integrato: 84437 - IN VIVO NEUROMETABOLIC DIAGNOSTICS BIO/12 5 24/0/30/0 No

Ambito: 610 - Medicina di laboratorio e diagnostica B

Obiettivi: Discuss conventional and innovative technologies for the quantitative mapping of in vivo central nervous system and neuromuscular metabolic biomarkers.
Describe in vivo neurometabolism in relationship to physiological and pathological conditions.
Discuss the application of in vivo connectome imaging for the investigation of ageing and pathogenetic mechanisms, and for diagnostic, prognostic and follow-up purposes in pathological conditions.
Develop expertise in the advanced processing and multi-level analyses of neurometabolic networks in line with the rapidly developing biomedical research and clinical settings.
Develop skills for working in multidisciplinary team including clinicians, neuropsychologists, physicists, bioinformaticists and technicians.

Obiettivi inglese: Discuss conventional and innovative technologies for the quantitative mapping of in vivo central nervous system and neuromuscular metabolic biomarkers.
Describe in vivo neurometabolism in relationship to physiological and pathological conditions.
Discuss the application of in vivo connectome imaging for the investigation of ageing and pathogenetic mechanisms, and for diagnostic, prognostic and follow-up purposes in pathological conditions.
Develop expertise in the advanced processing and multi-level analyses of neurometabolic networks in line with the rapidly developing biomedical research and clinical settings.
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Gruppo: Elective learning activities

TAF: D Ambito: 1008 - A scelta dello studente

Cfu min: 8 Cfu max: 15 Num. Esami: 1 Num. Idoneità: 0
La Scuola garantisce che, ai fini del rispetto del limite massimo di 12 esami/5 idoneità i CFU a scelta saranno acquisibili con 1 esami e 0 idoneità

Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ.	VER.

Gruppo: THESIS

TAF: E Ambito: 1018 - Per la prova finale

Cfu min: 20 Cfu max: 20
Note:

Attività formativa	TIP	SSD	TAF	CFU	ORE F/E/L/N	FREQ.	VER.

9081 000 000 86295 - 2 - INTERNSHIP ABROAD FOR PREPARATION FOR THE FINAL EXAMINATION		12	0/0/0/0	No	Voto
Ambito:	1018 - Per la prova finale	E			
9081 000 000 90377 - 2 - INTERNSHIP FOR PREPARATION FOR THE FINAL EXAMINATION		12	0/0/0/0	No	Voto
Ambito:	1018 - Per la prova finale	E			
9081 000 000 90053 - 2 - PREPARATION FOR THE FINAL EXAMINATION ABROAD		12	0/0/0/0	No	Voto
Ambito:	1018 - Per la prova finale	E			
9081 000 000 84545 - 2 - THESIS-		8	0/0/0/0	No	Voto
Ambito:		E			

Legenda:

CFU: crediti formativi universitari
TAF: tipologia attività formativa (A-di base; B-caratterizzanti; C-affini o integrative; F-ulteriori attività formative; D-a scelta autonoma dello studente; S- stages e tirocini presso imprese, enti pubblici o privati, ordini professionali; E-per la prova finale)
SSD: settore scientifico disciplinare
F/E/L/N: indica le ore Frontali/Esercitazioni/Laboratori/Ore di esercitazione e/o laboratorio tenute da non docenti
Freq.: segnala l'esistenza di un obbligo di frequenza
Ver.: indica la modalità di verifica del profitto finale
TIP.: indica la tipologia delle forme didattiche. Queste possono essere CON: convenzionali, E-L: in e-learning, MIX: miste, C/E: convenzionali e/o e-learning. Il corso di studio può definire annualmente una delle modalità.