UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Biomedicina, Neuroscienze e Diagnostica avanzata		
ACADEMIC YEAR	2020/2021		
BACHELOR'S DEGREE (BSC)	BIOMEDICAL LABORATORY TECHNIQUES		
INTEGRATED COURSE	PATHOLOGICAL ANATOMY - INTEGRATED COURSE		
CODE	09747		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	MED/46, MED/08		
HEAD PROFESSOR(S)	STASSI GIORGIO	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)	CABIBI DANIELA STASSI GIORGIO	Professore Ordinario Professore Ordinario	Univ. di PALERMO Univ. di PALERMO
CREDITS	9		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	3		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	**CABIBI DANIELA** Monday 14:00 15:00 Dipartimento PROMISE, Sez. Anatomia Patologica , 1 piano, Via del vespro 129 **STASSI GIORGIO** Wednesday 10:00 13:00 Laboratorio di Fisiopatologia Cellulare e Molecolare del Dipartimento di Discipline Chirurgiche e Oncologiche con sede in via del Vespro, n. 131 90127 Palermo.		

DOCENTE: Prof. GIORGIO STASSI

PREREQUISITES	Basic knowledge of cell biology, molecular biology, structure and function of nucleic acids and proteins, cytology and histology, anatomy.
LEARNING OUTCOMES	Knowledge and understanding: Acquiring the skills needed to understand the etiopathogenetic and pathological mechanisms of cancer and alterations in structures, functions and control mechanisms both at the genic and proteomic level regarding to the processes of initiation and progression of the disease. Ability to apply knowledge and understanding: the student must be able to apply their knowledge of the main topics concerning the study and diagnosis of tumors, must be able to choose and use appropriate approaches to individual problems in the diagnosis of neoplastic diseases and subsequently aware of the proper management of samples in order to obtain the best results allowing an adequate anatomo-pathological diagnosis. To this end, it will need to know all the causes of possible laboratory artifacts that can be the cause of diagnostic "pitfalls" and will know the repercussions of these in the patient's clinical management in order to be able to implement a proper strategy to avoid them. Assessment autonomy: The student will need to know the parameters to evaluate the suitability of the prepared preparations according to the various methods and to understand the fundamental role of the technician in the proper management of the laboratory.
ASSESSMENT METHODS	The evaluation will be made via oral test. The sufficiency threshold will be reached if the student shows knowledge and understanding of the issues at least in broad outline, and has application skillssufficient; he must also have presentation and argumentative skills allowing the transmission of his knowledge to the examiner. Below this threshold, the examination will be insufficient. The more the candidate will be able to interact with the examiner with his argumentative and presentation skills, and the more his knowledge and application capabilities will go into detail on the subjects under evaluation, the more the judgement will be positive. The evaluation is expressed using a 30-point scale. ECTS grades: A – A+ Excellent (30-30 cum laude) - Grade descriptors : 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. ECTS grade : B Very good (27-29) - Grade descriptors: 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. ECTS grade: C Good (24-26)- Grade descriptors: Good knowledge of teaching contents and good language control; the students should be able to apply their knowledge to solve problems of medium complexity. ECTS grade: D Satisfactory (21-23)- Grade descriptors: 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. ECTS grade: E Sufficient (18-20) - Grade descriptors: Minimum teaching content knowledge, often limited to the main topic; modest ability to use the subject specific language and independently apply the acquired knowledge. ECTS grade: F Fail (1-17) - Grade descriptors: 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. Exam failed.
TEACHING METHODS	The course includes a total of 90 hours of frontal lessons.

MODULE
MOLECULAR PATHOLOGY

Prof. GIORGIO STASSI

SUGGESTED BIBLIOGRAPHY

- Gulletta, Antonozzi. Medicina di laboratorio. Logica e patologia clinica. Editore PICCIN. Anno 2019. ISBN9788829929733.
- Amadori, Croce. Terapia molecolare in oncologia. Editore Poletto. Anno 2005. ISBN9788886786935.
- Maccarrone. Metodologie biochimiche e biomolecolari. Strumenti e tecniche per il laboratorio del nuovo millennio. Editore Zanichelli. Anno 2019. ISBN9788808520555.
- Wilson & Walker. Biochimica e biologia molecolare. Principi e tecniche. Editore Edises. Anno 2019. ISBN 9788832851458.

AMBIT	10341-Scienze e tecniche di laboratorio biomedico
INDIVIDUAL STUDY (Hrs)	90
COURSE ACTIVITY (Hrs)	60

EDUCATIONAL OBJECTIVES OF THE MODULE

Understanding of the etiopathogenetic mechanisms of human neoplasia with a particular study of genetic alterations. Particular importance will be given to the research tools with diagnostic/prognostic value and their use in the personalized treatment of cancer patients. The aim of this course is to enable students to apply anti-cancer principles and acquire useful skills in future professional activity.

SYLLABUS

Hrs	Frontal teaching
3	MAIN CHARACTERISTICS OF CANCER CELLS AND POSSIBLE THERAPEUTIC TARGETS. REPLICATIVE POTENTIAL, EVASION FROM APOPTOSIS, ANGIOGENESIS, TISSUE INVASION AND METASTASIS. ANGIOGENIC INHIBITORS, EGFR INHIBITORS.
2	INTRACELLULAR SIGNALING PATHWAYS AND THEIR ROLE IN TUMOR PROGRESSION
3	EPIDERMAL GROWTH FACTOR RECEPTOR. EGFR FAMILY, PROTEIN STRUCTURE, ACTIVATION MECHANISM (HOMO- AND HETERODYMER TRAINING), DOWNSTREAM PATHWAY, EGFR AND TUMORS (OVEREXPRESSION AND MUTATIONS), TECHNIQUES FOR DETECTION EGFR MUTATIONS, SANGER SEQUENCING, NEXT GENERATION SEQUENCING, FISH, DIGITAL PCR, ANTI-EGFR THERAPIES.
3	Mitogen-activated protein kinase (MAPK), SIGNAL TRANSDUCTION, PATHWAY REGULATION, EFFECTS MEDIATED BY PATHWAY DISREGULATION, BRAF MUTATION, ADAPTIVE RESPONSE TO THE INHIBITION OF MUTATED BRAF, PARADOXICAL EFFECT, HORIZONTAL (BRAF-MEK) AND VERTICAL COMBINATORY THERAPY (MAPK-PI3K).
3	Phosphoinositide 3-kinase, SIGNAL TRANSDUCTION, ROLE OF PI3K IN CANCERS (UNCONTROLLED PROLIFERATION AND INDEPENDENCE FROM GROWTH FACTORS, INHIBITION OF APOPTOSIS, ANGIOGENESIS, INVASION AND METASTASIS), INHIBITORS OF MTOR, COMBINATORIAL THERAPIES.
3	JAK-STAT SIGNALLING PATHWAY, ROLE OF THE PATHWAY IN BIOLOGICAL PROCESSES IN HEALTHY AND CANCER TISSUE, SIGNAL TRANSDUCTION, JAK/STAT STRUCTURE, LIGANDS / RECEPTORS ASSOCIATED WITH THE PATHWAY, CLINICAL IMPORTANCE, ROLE OF JAK-STAT IN THE IMMUNE SYSTEM, TARGETING JAK-STAT, HORIZONTAL THERAPIES (MAPK-PI3K), ROLE OF JAK-STAT IN CANCER PROGRESSION, REGULATION OF MESENCHIMAL PHENOTYPE.
3	INTRODUCTION TO THE TGF BETA PATHWAY, TGF TYPES, TGF BETA FUNCTIONS, SUPERFAMILY OF LIGANDS, CANONIC AND NON-CANONIC PATHWAY, TGF BETA AND TUMORS, CANCER-ASSOCIATED FIBROBLASTS, CELL DIFFERENTIATION, CANCER PROGRESSION, STROMAL REGULATION, BREAST CANCER METASTASES, ANGIOGENESIS, TGF BETA INHIBITORS.
3	SUSTAINED PROLIFERATION AND INHIBITION OF CELL CYCLE ARREST, PHASES OF THE CELL CYCLE, REGULATION OF THE CELL CYCLE, CYCLINS AND CYCLIN-DEPENDENT KINASE, CYCLIN INHIBITORS, RB, GROWTH FACTORS, ONCOGENE AND TUMOR SUPPRESSORS.
3	INVASION, METASTATIC POTENTIAL AND ANGIOGENESIS, CELL-CELL AND CELL-SUBSTRATE ADHESION MOLECULES, INTEGRINE, COMPONENTS OF THE EXTRA CELL MATRIX, METALLOPROTEINASES, CHEMOATTRACTANTS, CXCR4, CXCR5, TUMOR STROMA (IMMUNE SYSTEM CELLS, INFLAMMATORY CELLS, MUSCULAR CELLS AND MYOFIBROBLASTS, VASCULAR CELLS), TENASCIN-C.
6	IMMUNO-ESCAPE AND PROMOTION OF CHRONIC INFLAMMATION, TUMORS AND IMMUNITY, IMMUNOLOGICAL SURVEILLANCE THEORY, TUMOR IMMUNOEDITING (ELIMINATION-BALANCE-ESCAPE), RECOGNITION BY THE IMMUNE SYSTEM (INNATE AND ADAPTIVE), NK CELLS, MACROPHAGES, IMMUNOTHERAPY, CANCER VACCINES, ADOPTIVE CELL TRANSFER, MONOCLONAL ANTIBODIES, IMMUNITY CHECKPOINTS, IMMUNITY CHECKPOINT INHIBITORS.

6	CROSS-TALK BETWEEN CANCER CELLS AND MICROENVIRONMENT: MICRO RNA, LONG NON-CODING RNA, EXOSOMES. NON-CODING DNA PROTEINS, NOMENCLATURE / BIOGENESIS / MATURATION OF MIRNA, ROLE OF MIRNA IN DEVELOPMENT / HEMATOPOIESIS / TUMORS, MIRNOMA, ROLE OF MIRNA IN THE CELL CYCLE / APOPTOSIS / INVASION / ANGIOGENESIS, DIAGNOSTIC AND THERAPEUTIC TOOL, LNCRNA, LOCALIZATION AND FUNCTION, LNCRNA IN TUMORS, EXOSOMES, STRUCTURE AND BIOLOGICAL ROLE, EXOSOMES IN TUMORS.
6	EPIGENETICS AND CANCER: INNOVATIVE TECHNIQUES FOR THE STUDY OF DNA ALTERATIONS. ETERO- AND EU-CHROMATIN, HYPOTHESIS OF THE HISTONIC CODE, HISTONIC MODIFICATIONS, INVOLVED ENZYMES (METHYLATION, ACETYLATION), EPIGENETICS OF TUMORS, CPG ISLANDS, GENETIC / EPIGENETIC COOPERATION, HISTONE METHYL TRANSFERASE, HISTONE DEMETYLASAS, HISTONE DEMETYLASASYPHYLETHYLASIS, MYC, BRD4, IDENTIFICATION OF EPIGENETIC CHANGES, PYROSEQUENCING, GLOBAL METHYLATION ANALYSIS, NGS, ELISA, QPCR CHIP, CHIP-ON-CHIP, IMMUNOHISTOCHEMISTRY, INHIBITORS OF EPIGENETIC AND CLINICAL TRIAL CHANGES, INHIBITORS OF HDAC/DNMT/BET, COMBINATORIAL THERAPIES.
3	MOLECULAR SCREENING IN ONCOLOGY AND PERSONALIZED THERAPY
3	REAL-TIME PCR, PRINCIPLES, ADVANTAGES, ONE STEP PCR, TWO STEPS PCR, FLUORESCENT PROBES (SYBR GREEN, TaqMan), QUANTITATIVE FLUORESCENCE, INSTRUMENTATION, TERMINOLOGY, STANDARD CURVE AND CT, MELTING CURVE, ABSOLUTE VERSUS SEMIQUANTITATIVE QUANTIFICATION, MOLECULAR DIAGNOSTICS, IDENTIFICATION OF PATHOGENS, SINGLE NUCLEOTIDE POLYMORPHISMS, DIGITAL PCR, WORKFLOW AND QUANTIZATION, REAL-TIME PCR / DIGITAL PCR COMPARISON.
3	CYTOFLUORIMETRY, PRINCIPLES AND FUNCTIONING, OPTICS, LASER, FSC / SSC, FLUOROCROMS, OPTICAL FILTERS, DOT PLOT GRAPHS, DATA ANALYSIS, RESEARCH AND CLINIC APPLICATIONS, CELL CYCLE ANALYSIS, DEPARRAY, PROCEDURE AND APPLICATIONS, ISOLATION OF CELLS FROM FFPE AND CIRCULANT CELLS.
3	IMMUNOHISTOCHEMISTRY, INTRODUCTION AND GENERAL PRINCIPLES, DIRECT / INDIRECT, IMMUNOHISTOCHEMISTRY / IMMUNOFLUORESCENCE, STEPS, PRIMARY AND SECONDARY ANTIBODIES, MONOCLONAL AND POLYCLONAL ANTIBODIES, HEMATOXYLINE / EOSINE, FLUORESCENCE MICROSCOPY, CONFOCAL MICROSCOPY.
4	TRADITIONAL SEQUENCING AND NEXT GENERATION SEQUENCING, PRINCIPLES / FUNCTIONING/RESEARCH AND CLINICAL APPLICATIONS, SANGER, PIROSQUENCING, ILLUMINA / ION TORRENT PLATFORMS.

MODULE
PATHOLOGICAL ANATOMY

Prof.ssa DANIELA CABIBI

SUGGESTED BIBLIOGRAPHY

Robbins e Cotran “Le basi Patologiche delle Malattie” Elsevier 2005

Ruco, Scarpa: “Anatomia Patologica – le basi “ – UTET Torino 2007

Slides of the teacher

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

EDUCATIONAL OBJECTIVES OF THE MODULE

acquisition of the basic principles for the proper management of histological and cytological samples and histochemical, immunohistochemical and molecular techniques necessary to reach the pathologic diagnosis

SYLLABUS

Hrs	Frontal teaching
3	Introduction - Levels of organization of the life -Elements of histology microscopes and resolving power
3	microscopic anatomy: skin, digestive tract, lung, breast
3	epithelial and mesenchymal tissues
3	General information on cancer: role of the pathologist in cancer diagnosis; the concepts of hyperplasia, metaplasia, desmoplasia, dysplasia, anaplasia
3	Nomenclature of tumors Oncogenesis: oncogenes and tumor suppressor genes, macroscopic aspects of cancer Grading. Staging (TNM) tumor progression, invasion and metastasis prognostic factors paraneoplastic syndromes
2	Fixation, inclusion, processing and cutting
2	histochemical stainings
2	Immunohistochemistry. Double staining immunohistochemistry
1	Sentinel lymph node examination
1	muscle biopsy
2	pap test
2	Management of cytology specimens
2	the autopsy
2	In situ hybridization (Cish - Sish)