UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Biomedicina, Neuroscienze e Diagnostica avanzata
ACADEMIC YEAR	2022/2023
MASTER'S DEGREE (MSC)	MEDICINE AND SURGERY
SUBJECT	HISTOLOGY AND EMBRYOLOGY
TYPE OF EDUCATIONAL ACTIVITY	A
AMBIT	50424-Morfologia umana
CODE	04111
SCIENTIFIC SECTOR(S)	BIO/17
HEAD PROFESSOR(S)	SPATOLA GIOVANNI FRANCESCO — Ricercatore — Univ. di PALERMO LA ROCCA GIAMPIERO — Professore Associato — Univ. di PALERMO BONAVENTURA GIUSEPPE — Ricercatore — Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	90
COURSE ACTIVITY (Hrs)	60
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**BONAVENTURA GIUSEPPE** Monday 9:00 12:00 Dipartimento BIONEC **LA ROCCA GIAMPIERO** Wednesday 11:00 12:30 Plesso di Anatomia e Istologia, Dipartimento BiND, Policlinico Universitario **SPATOLA GIOVANNI FRANCESCO** Wednesday 9:30 12:30 Sezione di Istologia BIONEC Policlinico Via del Vespro, 129, 90127Palermo Thursday 9:30 12:30 Sezione di Istologia BIONEC Policlinico Via del Vespro, 129, 90127Palermo

DOCENTE: Prof. GIAMPIERO LA ROCCA- *Sede CHIRONE*

PREREQUISITES	Basic concepts about Chemistry, Biochemistry, Molecular and cellular biology already acquired.
LEARNING OUTCOMES	Knowledge and comprehension ability Acquisition of the histological and embryological terminology as base of the communication and interpretation of the morphological sciences. Ability to apply comprehension and knowledge Intellectual ability to the diagnostic of the four categories of normal human tissues, with special focus on orofacial structures and teeth-specific tissues, with adequate knowledge of the embryological development steps also referring to clinical embryology. Judgement autonomy To be adequate in integrating the morphological knowledge and applying the information to the morphofunctional scientific research. Moreover, acquire critical capacity in data evaluation and in the information panorama of morphlogy. Communication skills Clear comprehension of the aims of the global knowledge, demonstrqating a critical development of the dimensions of listening, as well as clear and effective communication. Learning skills To be able to adequately formulate autonomous judgements. Be able to develop paths leading, also with links with other scientific subjects, to a wider horizon in the morphological data interpretation.
ASSESSMENT METHODS	Oral Exam A – A+ Excellent 30-30 e lode Excellent knowledge of the contents of the subject; the student shows a high capacity to analyze and synthesize concepts. The student is able to apply the knowledge to solve highly complex problems. B Very good 27-29 Very good knowledge of the contents of the subject and language ability. linguaggio; the student shows a high capacity to analyze and synthesize concepts and can apply the acquired knowledge to the resolution of medium complexity problems, and in some canses also elevated complexity ones. C Good 24-26 Good knowledge of the subject and language skills. The student can apply the acquired concepts to solve medium difficulty problems. D Satisfactory 21-23 More than sufficient knowledge of the subject, even if somewhat limited with regards to the details of notions. Satisfactory ability in the use of the subjectspecific language. The student can autonomously apply the acquired information. E Sufficient 18-20 Minimal knowledge of the subject, often limites to the main topics. Limited ability in using the subject-specific language. Limited ability in the autonomous application of the acquired knowledge. F Fail The student has not developed a sufficient knowledge of the main aspects of the subject. Very limited or absent ability to use the subject-specific language. Very limited ability in applying the acquired knowledge.
EDUCATIONAL OBJECTIVES	Having done their knowledge about the ecosystem bio cell, to the organization of the major tissues ; yet to know the evolution of the various phases of human embryo development both in the field of descriptive and on the relationship with the molecular movements that direct and modulate the various stages of prenatal development .
TEACHING METHODS	Frontal lessons
SUGGESTED BIBLIOGRAPHY	Kierszenbaum, Tres. Istologia - Dalle basi molecolari alle correlazioni cliniche. Quinta Edizione, EDRA, 2020, ISBN: 9788821452406 AA.VV.: Istologia Umana, Idelson Gnocchi, 2020, ISBN: 9788879477253 AA.VV.: Istologia di Monesi, Piccin, 2019, ISBN: 9788829928132 AA.VV.: Embriologia Umana, Idelson Gnocchi, 2019 ISBN: 9788879476867 Moore, Persaud, Torchia: Before We Are Born - Essentials of Embryology and

	Birth Defects, Elsevier, 2019, ISBN: 9780323608497

SYLLABUS

Hrs	Frontal teaching
3	1 / I. MEANS AND METHODS History of Histology and its study methods: the first means of investigation until light microscope. The optical microscope: the 'parts' of the optical microscope. the light microscope limits. The diffraction of light and Hairy discs. Width of the circular visual. The fluorescence microscope. The confocal laser microscope. The microscope in phase contrast. The polarizing microscope. The electron microscope: basic structure of the electron microscope. Resolving power theoretical and real. Technical set-up of the slides: the fixation to the inclusion. Artifacts. The dyes: classifications. Property 'of the dyes; factors influencing the activity of the dyes. Theories about the mechanism of coloration. Techniques of construction of sections: microtome, ultramicrotome, cryostat. The histochemical and cytochemical methods: general histochemical techniques. Smear of blood. Immunohistochemistry: application of the revelation of the peroxidase immunohistochemical techniques.
6	/ I . CYTOLOGY Cell doctrine. Syncytia and plasmodia. Cell differentiation. General architecture of the cell morphology. The physical and chemical characterization of the cell: the inorganic and organic components. Cellular metabolism and vital manifestations of the protoplasm . The structural and ultrastructural morphological characterization of the cell : the cytoplasmatic membrane unit: ultrastructure and function of the plasmatic membrane; plasmatic membrane morpho - functional differentiations . The devices microcavity cytoplasmic : ultrastructure and functions of the endoplasmic reticulum, mitochondria, lysosomes, peroxisomes, Golgi complex. The macromolecular characterization of cellular constituents : Microtrabecular lattice and cytoskeleton
30	/ I. Histology Tissues. Organs. Systems. Classification of tissues. Epithelial tissue: classification and morphofunctional considerations of epithelia: lining epithelia, sensory, secreting. The units' secreting cell, exocrine glands, the endocrine glands (classification and structural organization). The hypothalamus-pituitary system. The diffuse neuroendocrine system. The connective tissue: classification and morphological and functional considerations. The cells and the extracellular matrix: macromolecular and functional considerations. The mesenchyme. The connective tissues; cartilaginous tissue; the bone tissues; blood, tissues and bloodforming organs. The contractile tissues: smooth muscle, skeletal striated muscle tissue, cardiac striated muscle tissue. Nervous tissue: evolution of the study concerning neuron and investigative procedures. The neuron as entities' morphological: number and size of neurons; shape of the neurons; classifications; structure and ultrastructure of the neuron components (the membrane of the neuron, the pirenoforo, the tigroide substance, neurotubules and neurofilament, the dendrites, the neuritis, the nerve fiber). Ways of neuron connection: central and peripheral nerve endings. electrical synapses. chemical synapses and their mode of nerve impulse transduction. endocytosic recycling. The neuron as cytochemistry entities . Glia: generalities. Glia of the CNS: ependyma, macroglia, oligodendroglial, microglia, pituicytes, Müller cells, Bergmann cells, PNS glial cells.
4	EMBRYOLOGY 1 / E. GENERALITY Introduction: meaning and development of Embryology. The various stages of embryonic development, embryo-fetal measurements. embryo-fetal anatomy: description of the various parts of embryo and fetus. Determination and sex differentiation: differentiation of gonads. Primordial germ cells. The development of the male and female gonads. The development of the sperm tracts and of the genital organs. Generality on male genitalia: The testicular unit: The Didymus, epididymis, the seminiferous tubule and Leydig cells. The sperm ducts. The neurohormonal control of male gonadali functions. Generality female genitalia: the united and ovarian folliculogenesis pre-postpubertal; the fallopian tube; the uterus; the vagina. The neurohormonal control of female gonadali functions. The male gamete: the seminiferous epithelium cycle. The cells of the seminal line. Spermatogonia. Spermatocytes. Spermatids. The spermioistogenesis. The sperm. abnormal sperm. The female gametogenesis: oogenesis and projection in the ovarian cycle, uterine and vaginal.
6	2 / E. FERTILIZATION AND EMBRYONIC FIGURES Fertilization: meaning of fertilization. The journey of the sperm through the male genital tract. Maturation and motility sperm. The emission of sperm. The sperm or semen. The sperm capacitation. Vitality 'sperm. Route and vitality oocyte. Phenomenology of fertilization: the acrosome reaction, sperm penetration in ovules, of the oocyte activation, cortical reaction. Zygote formation. IVF: general information. Segmentation: from morula to blastula. Types of egg. Types of segmentation. Segmentation in placental mammals. Development programming. Control of the early stages of development by maternal genetic programs. Transition from mother's program to the embryo. Control of the embryonic development program. Blastogenesis (Nesting and decidual reaction). Gastrulation: the meaning of gastrulation. Gastrulation in placental mammals. cytoskeletal mechanisms during morphogenesis. germ layers. Coordinating cytoskeletal and intercellular signals during gastrulation. The neurulation: meaning and organizational commitment.
7	3 / E. MORPHOGENESIS And HISTOGENESIS Embryonic development and morphogenesis in humans: induction (endogenous and exogenous inducers, the primary and secondary., Interactions, organizers), Determination, morphogens, Stem Cells. The first week of development (segmentation). The second week of development (preparation for gastrulation). The third week of development (gastrulation). The fourth week of development (secondary morphogenesis). From fifth to thirtyeighth week of development. Histogenesis. The evolution of the germ layers: introduction. ectodermal derivatives. entodermici derivatives. mesodermal derivatives. The fetal membranes: introduction. The embryonic annexes in placental mammals. The fetal membranes (embryofetal) in humans.

SYLLABUS

Hrs	Frontal teaching
4	4 / E. ORGANOGENESIS Development overview of the central nervous system, Respiratory and Cardiovascular systems, hemopoiesis, Development of Gastrointestinal and Urogenital Systems.

DOCENTE: Prof. GIOVANNI FRANCESCO SPATOLA- *Sede HYPATIA*

PREREQUISITES	Basic Concepts of Chemistry, Biochemistry, Molecular and Cellular Biology acquired in earlier or contemporary courses.
LEARNING OUTCOMES	Learning Outcomes Acquisition of histological and embryological basic terminology as the basis for definition and critical interpretation of the morphological knowledge. Capacity 'to apply Knowledge and Understanding Know the main features structural and ultrastructural of cells and tissues in relation to their activities and embryological derivation. Autonomy of Rating Offered to students will be opportunities for discussion of the learning level, which will enable them to verify the knowledge acquired on topics of study subject, for good to promptly fill any gaps. Communicative skills Being Able to describe and illustrate through specific Terminology the essential features, the structural and ultrastructural organization of cells and tissues, related to Their specifics Function. Learning ability Acquire the ability 'integration of data derived from the study of the morphology of cells and tissues and their correlations between structure and function, Which essential cultural heritage for future understanding of the physiology and pathophysiology of the organs and human body systems .
ASSESSMENT METHODS	ORAL TEST Eccellente A – A+ Excellent30-30 e lode Excellent knowledge of teaching content ; the student demonstrates high analytic - synthetic capacity and is able to apply the knowledge to solve problems of high complexity Ottimo B Very good27-29 Excellent knowledge of teaching content and excellent properties of language ; the student demonstrates analytical - synthetic capacity and able to apply the knowledge to solve problems of medium complexity and , in some cases , even high Buono C Good24-26 Good knowledge of teaching content and good properties of language ; the student is able to apply the knowledge to solve problems of medium complexity Discreto D Satisfactory21-23 Good knowledge of teaching content , in some cases limited to the main topic ; acceptable ability to use the specific language of the discipline and independently apply the acquired knowledge Sufficiente E Sufficient18-20 Basic knowledge of teaching content , often limited to arguments Main ; modest ability to use the language of specific discipline and apply the knowledge acquired Insufficiente F Fail One does not have acceptable knowledge of the main teaching content ; very little or no ability to use the language of specific discipline and apply the knowledge acquired
EDUCATIONAL OBJECTIVES	Having done their knowledge about the ecosystem bio cell, to the organization of the major tissues ; yet to know the evolution of the various phases of human embryo development both in the field of descriptive and on the relationship with the molecular movements that direct and modulate the various stages of prenatal development .
TEACHING METHODS	Frontal teaching, remote teaching
SUGGESTED BIBLIOGRAPHY	•BIOLOGIA-CITOLOGIA MEDICA Maraldi, Tacchetti et al. - Edi Ermes 2016 ISBN 9788870513899 •ISTOLOGIA MEDICA Maraldi, Tacchetti et al. - Edi Ermes 2016 ISBN

	9788870513899 •ISTOLOGIA Rosati, Colombo, Maraldi – V edizione Edi Ermes 2007 ISBN 8870512940 •LO SVILUPPO PRENATALE DELL'UOMO Moore, Persaud - EDRA 2020 ISBN 9788821452208

SYLLABUS

Hrs	Frontal teaching
5	1 / I. MEANS AND METHODS History of Histology and its study methods: the first means of investigation until light microscope. The optical microscope: the 'parts' of the optical microscope. the light microscope limits. The diffraction of light and Hairy discs. Width of the circular visual. The fluorescence microscope. The confocal laser microscope. The microscope in phase contrast. The polarizing microscope. The electron microscope: basic structure of the electron microscope. Resolving power theoretical and real. Technical set-up of the slides: the fixation to the inclusion. Artifacts. The dyes: classifications. Property 'of the dyes; factors influencing the activity of the dyes. Theories about the mechanism of coloration. Techniques of construction of sections: microtome, ultramicrotome, cryostat. The histochemical and cytochemical methods: general histochemical techniques. Smear of blood. Immunohistochemistry: application of the revelation of the peroxidase immunohistochemical techniques.
6	2 / I . CYTOLOGY Cell doctrine. Syncytia and plasmodia. Cell differentiation. General architecture of the cell morphology. The physical and chemical characterization of the cell: the inorganic and organic components. Cellular metabolism and vital manifestations of the protoplasm . The structural and ultrastructural morphological characterization of the cell : the cytoplasmatic membrane unit: ultrastructure and function of the plasmatic membrane; plasmatic membrane morpho - functional differentiations . The devices microcavity cytoplasmic : ultrastructure and functions of the endoplasmic reticulum, mitochondria, lysosomes, peroxisomes, Golgi complex. The macromolecular characterization of cellular constituents : Pattern microtrabecular and cytoskeleton .
30	3 / I. Histology Tissues. Organs. Systems. Classification of tissues. Epithelial tissue: classification and morphofunctional considerations of epithelia: lining epithelia, sensory, secreting. The units' secreting cell, exocrine glands, the endocrine glands (classification and structural organization). The hypothalamus-pituitary system. The diffuse neuroendocrine system. The connective tissue: classification and morphological and functional considerations. The cells and the extracellular matrix: macromolecular and functional considerations. The mesenchyme. The connective tissues; cartilaginous tissue; the bone tissues; blood, tissues and blood-forming organs. The contractile tissues: smooth muscle, skeletal striated muscle tissue, cardiac striated muscle tissue. Nervous tissue: evolution of the study concerning neuron and investigative procedures. The neuron as entities' morphological: number and size of neurons; shape of the neurons; classifications; structure and ultrastructure of the neuron components (the membrane of the neuron, the pirenoforo, the tigroide substance, neurotubules and neurofilament, the dendrites, the neuritis, the nerve fiber). Ways of neuron connection: central and peripheral nerve endings. electrical synapses. chemical synapses and their mode of nerve impulse transduction. endocytosic recycling. The neuron as cytochemistry entities . Glia: generalities. Glia of the CNS: ependyma, macroglia, oligodendroglial, microglia, pituiciti, Müller cells, gliocyties
6	EMBRYOLOGY 1 / E. GENERALITY Introduction: meaning and development of Embryology. The various stages of embryonic development, embryo-fetal measurements. embryo-fetal anatomy: description of the various parts of embryo and fetus. Determination and sex differentiation: differentiation of gonads. Primordial germ cells. The development of the male and female gonads. The development of the sperm tracts and of the genital organs. Generality on male genitalia: The testicular unit: The Didymus, epididymis, the seminiferous tubule and Leydig cells. The sperm ducts. The neurohormonal control of male gonadali functions. Generality female genitalia: the united and ovarian folliculogenesis pre-postpubertal; the fallopian tube; the uterus; the vagina. The neurohormonal control of female gonadali functions. The male gamete: the seminiferous epithelium cycle. The cells of the seminal line. Spermatogonia. Spermatocytes. Spermatids. The spermioistogenesis. The sperm. abnormal sperm. The female gametogenesis: oogenesis and projection in the ovarian cycle, uterine and vaginal.
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3	4 / E. ORGANOGENESIS Development overview of the central nervous system and Cardiovascular (hematopoiesis) system.

DOCENTE: Prof. GIUSEPPE BONAVENTURA- *Sede IPPOCRATE*

PREREQUISITES	Basic Concepts of Chemistry, Biochemistry, Molecular and Cellular Biology acquired in earlier or contemporary courses.
LEARNING OUTCOMES	Learning Outcomes Acquisition of histological and embryological basic terminology as the basis for definition and critical interpretation of the morphological knowledge. Capacity 'to apply Knowledge and Understanding Know the main features structural and ultrastructural of cells and tissues in relation to their activities and embryological derivation. Autonomy of Rating Offered to students will be opportunities for discussion of the learning level, which will enable them to verify the knowledge acquired on topics of study subject, for good to promptly fill any gaps. Communicative skills Being able to describe and illustrate through specific terminology the essential features, the structural and ultrastructural organization of cells and tissues, related to Their specifics Function. Learning ability Acquire the ability 'integration of data derived from the study of the morphology of cells and tissues and their correlations between structure and function, which essential cultural heritage for future understanding of the physiology and pathophysiology of the organs and human body systems .
ASSESSMENT METHODS	ORAL TEST Eccellente A – A+ Excellent 30-30 e lode Excellent knowledge of teaching content ; the student demonstrates high analytic - synthetic capacity and is able to apply the knowledge to solve problems of high complexity Ottimo B Very good 27-29 Excellent knowledge of teaching content and excellent properties of language ; the student demonstrates analytical - synthetic capacity and able to apply the knowledge to solve problems of medium complexity and , in some cases , even high Buono C Good 24-26 Good knowledge of teaching content and good properties of language ; the student is able to apply the knowledge to solve problems of medium complexity Discreto D Satisfactory 21-23 Good knowledge of teaching content , in some cases limited to the main topic ; acceptable ability to use the specific language of the discipline and independently apply the acquired knowledge Sufficiente E Sufficient 18-20 Basic knowledge of teaching content , often limited to arguments Main ; modest ability to use the language of specific discipline and apply the knowledge acquired Insufficiente F Fail One does not have acceptable knowledge of the main teaching content ; very little or no ability to use the language of specific discipline and apply the knowledge acquired
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TEACHING METHODS	Lessons.
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	ISBN 9788870513899 ISTOLOGIA MEDICA Maraldi, Tacchetti et al. - Edi Ermes 2016 ISBN 9788870513899 ISTOLOGIA Rosati, Colombo, Maraldi – V edizione Edi Ermes 2007 ISBN 8870512940 LO SVILUPPO PRENATALE DELL'UOMO Moore, Persaud - EDRA 2020 ISBN 9788821452208

SYLLABUS

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SYLLABUS

Hrs	Frontal teaching
4	3 / E. MORPHOGENESIS And HISTOGENESIS Embryonic development and morphogenesis in humans: induction (endogenous and exogenous inducers, the primary and secondary., Interactions, organizers), Determination, morphogens, Stem Cells. The first week of development (segmentation). The second week of development (preparation for gastrulation). The third week of development (gastrulation). The fourth week of development (secondary morphogenesis). Histogenesis. The evolution of the germ layers: introduction. ectodermal derivatives. entodermici derivatives. mesodermal derivatives. The fetal membranes: introduction. The embryonic annexes in placental mammals. The fetal membranes (embryofetal) in humans.
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