

COURSE OF STUDY DENTISTRY AND DENTAL PROSTHODONTICS

ACADEMIC YEAR 2023-2024

TEACHING NAME HISTOLOGY AND EMBRYOLOGY

Main information about teaching	
Course year	<i>1 year</i>
Delivery period	<i>1 semester</i>
University credits (CFU/ETCS):	<i>8 CFU</i>
SSD	<i>BIO/17</i>
Language	<i>italian</i>
Mode of attendance	<i>mandatory</i>

Teacher	<i>Histology and Cytology</i>
First and Last Name	<i>Silvia Concetta Colucci</i>
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Phone	
Head office	<i>Istituto di Anatomia Umana ed Istologia "Rodolfo Amprino"</i>
Virtual office	
Reception	<i>Wednesday 13.00 – 14.00</i>

Teacher	<i>Embryology of the stomatognathic apparatus</i>
First and Last Name	<i>Maria Grano</i>
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Phone	
Head office	<i>Istituto di Anatomia Umana ed Istologia "Rodolfo Amprino"</i>
Virtual office	
Reception	<i>Wednesday 13.00 – 14.00</i>

Organization of teaching			
Hours			
Total	Frontal teaching	Practice (lab, field, exercise, other)	
200	96	0	104
CFU/ETCS			
8	8	0	

Learning objectives	<p>CYTOLOGY</p> <p><i>The student will be expected to acquire the ability to understand the morphological organization of eukaryotic cells and subcellular structures, their genesis and correlations. Special emphasis will be given to the specializations of membranes, cell-to-cell and cell-to-extracellular matrix junction devices, and intracellular organelles with cell examples from specific tissues where they are most represented.</i></p> <p><i>This will enable an understanding of how cells can, by taking on specific forms and functions, peculiarly characterize various tissues.</i></p>
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	<p>HISTOLOGY</p> <p><i>The student should acquire the ability to understand the structural and ultrastructural organization of human tissues and the mechanisms of tissue histogenesis and regeneration. He/she will also need to understand the basis of tissue formation and development from the regulation of stem cell proliferation and self-maintenance processes. It will be essential to be able to recognize the specific morphological characteristics of different tissues, the cells that are part of them, and will have to know the supramolecular arrangements of the extracellular matrix being able to correlate them with the anatomical and functional aspects that oversee their integrity and inter-tissue integration in the composition of different organs. In addition to mastering the correct histological classifications and in the 'morpho-functional interpretation of tissues, the knowledge attained must also include the specific repair, renewal, and aging properties of each tissue and in particular bone tissue. This will provide an understanding of the principles and applications of histological structures in dental and non-dental regenerative medicine. The student should also be familiar with the main histological techniques that highlight morphological and ultrastructural characteristics of cells and tissues.</i></p> <p>EMBRIOLOGY</p> <p><i>The student should acquire basic knowledge of germ cells and their characteristics, the biological processes underlying fertilization, cell differentiation, and the morpho-dynamic events chronologically related to human fetal/embryonic development and specifically the development of the stomatognathic apparatus precisely of the oral cavity, head and neck</i></p>
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<p>Expected learning outcomes</p>	<p><i>After the end of the course, the student should know the basic information of the cellular and morphological aspects of tissues with particular focus on calcified tissues. This background is crucial for the study of the anatomy and physiology of organs and apparatuses and for the understanding of the pathogenetic mechanisms of diseases that will be explored in further teaching. The morphology-function link and the molecular basis of the cellular processes of tissues should contribute to the acquisition of the critical method and scientific rigor of study in the biomedical and dental fields.</i></p>
<p>DD1 Knowledge skills</p>	<p>Knowledge and Ability to Understand:</p> <p><i>The student must demonstrate basic knowledge of cell morphology and extracellular matrices of various tissues. He/she must know the processes of proliferation and differentiation from stem precursors to differentiated cytotypes for understanding embryonic/fetal development with insights into the human stomatognathic apparatus.</i></p>
<p>DD2 Applied knowledge and understanding skills</p>	<p>Applied knowledge and comprehension skills:</p> <p><i>The student should be able to apply knowledge of the cellular and structural organization of tissues and embryology of the stomatognathic apparatus to then undertake knowledge of the anatomy as well as physiological and pathological mechanisms characterizing the diseases.</i></p>
<p>DD3-5 Transversal skills</p>	<p>Autonomy of judgment:</p> <p><i>The student, encouraged during the lessons by specific questions on histological knowledge and its applications in the medical-dental field, should be able to evaluate autonomously the highlights of his or her working life and make appropriate career decisions in the future.</i></p>

	<p>Communication skills: <i>The student must have the ability to express the learned knowledge clearly and comprehensibly.</i></p> <p>Ability to learn: <i>The student should also be able to examine and understand scientific texts so that they can be used in everyday professional and research contexts. Finally, the student must demonstrate the ability to use the concepts and acquired knowledge by showing the ability to argue in accordance with the specific discipline rationale.</i></p>
Teaching content (Program)	<p>CYTOLOGY (2 CFU) <i>The cell: techniques for studying cells and cellular tissues. Plasma membrane: organization of lipids and proteins. Nuclear membrane, intracellular compartments. Membrane transport. Cytoskeleton, intermediate filaments, microtubules. Centrosome, cilia and flagella. Microfilaments and microvilli. Cell communication: occluding junctions, gap junctions. Mitochondria. Lysosomes. Smooth and rough endoplasmic reticulum. Exocytosis and endocytosis. Intracellular vesicular transport.</i></p> <p>HISTOLOGY (6 CFU) <i>Introduction to the study of tissues. Epithelial tissue and general characteristics. Monostratified and multilayered epithelia. Epidermis. Exocrine glands: origin and classification, mode of secretion. Exocrine glands-tubular, sweat, salivary, sebaceous, gastric and intestinal (liver and exocrine pancreas). Endocrine glands: histological organization, structure of protein- and steroid-secreting glands. Modes of secretion accumulation and synthesis. Endocrine glands: thyroid gland, endocrine pancreas, adrenal glands, pituitary gland, testis interstitial gland, and endocrine activity of ovary cells. Loose and dense connective tissue: extracellular matrix (glycosaminoglycans, proteoglycans and noncollagenous proteins, collagenous, reticular and elastic fibers). Connective tissue cells: fibroblasts, macrophages (circulating phagocyte system), mast cells, blood white series cells in connectives. Dermis and skin adnexa. Connective tissue varieties and localization of connective tissue varieties. Adipocytes and white and brown adipose tissue. Blood: hematopoiesis and bone marrow. Erythrocytes and platelets. White blood cells: origin and functions. Granulocytes, monocytes, lymphocytes: T and B lymphocytes. Antibodies and plasma cells. Lymph and primary and secondary lymphoid organs. Natural or innate immunity. Acquired or adaptive immunity. Cartilaginous tissue. Bone tissue (general tissue organization: compact and trabecular, bone matrix: inorganic and organic parts. Matrix proteins and their functions. Vascularization of bone tissue. Periosteum. Tissue cells: osteoclasts, origin, structure, and resorption activity; osteoblasts: origin, structure, and matrix mineralization; osteocytes: Mechanosensors, regulators of bone remodeling and mineral homeostasis. Bone cell communication, cytokines, and tissue growth factors. Bone remodeling</i></p>

	<p><i>and its regulation. Osteogenesis: direct ossification and chondral ossification. Hormones regulating bone tissue.</i></p> <p><i>The tooth: structure, enamel and dentin, cementum, pulp, periodontium and clinical correlations.</i></p> <p><i>Muscle tissue: histogenesis and classification of muscle tissue. Skeletal striated muscle tissue.</i></p> <p><i>Cardiac striated muscle tissue (contraction and conduction myocardium).</i></p> <p><i>Smooth muscle tissue. The morpho-functional basis of muscle contraction.</i></p> <p><i>Nervous tissue: histogenesis and generalities about the central nervous system and peripheral nervous system. The neuron: shape and size of neurons. Structure and ultrastructure of the neuronal body and its extensions.</i></p> <p><i>The nerve fiber; classification of nerve fibers and their structure process of myelination. The interneuronal synapse. The somatic neuromuscular junction (motor and visceral plate).</i></p> <p><i>Peripheral nerve endings in epithelium, connective and skeletal muscle.</i></p> <p><i>Nerve receptors: generalities and classification criteria.</i></p> <p><i>Neuroglia. Neuroglia cells of the central nervous system and peripheral nervous system.</i></p> <p>EMBRYOLOGY OF THE STOMATOGNATHIC SYSTEM (2 CFU)</p> <p><i>Generalities on embryonic development: From ovulation to implantation (first week of development).</i></p> <p><i>The bilaminar germinal disc (second week of development).</i></p> <p><i>The trilaminar germinal disc (third week of development).</i></p> <p><i>Delimitation of the shape of the embryo (fourth week of development).</i></p> <p><i>Derivatives of the three embryo leaflets. Special embryology and histology of the oral cavity. Development of the head and neck: formation of the skull.</i></p> <p><i>Differentiation of the cartilages, muscles and nerves of the pharyngeal arches.</i></p> <p><i>Development of the tongue and branchial pocket derivatives; morphogenesis of the face.</i></p> <p><i>Odontogenesis. Dental enamel.</i></p> <p><i>The dentin and dental pulp.</i></p> <p><i>The periodontium. Dental eruption and the fall of primary teeth.</i></p> <p><i>The mucous tonaca of the oral cavity. Salivary glands.</i></p> <p><i>Temporo-mandibular joint.</i></p>
<p>Reference texts</p>	<p><i>Monesi. "Istologia" - V o VI edizione – Ed. Piccin</i></p> <p><i>Albert et al. "L'essenziale di biologia molecolare della cellula" – Ed. Zanichelli</i></p> <p><i>Mjor. "Embriologia e istologia del cavo orale" – Ed. Edi-Ermes</i></p> <p><i>Moore, Persaud, Torchia "Embriologia – L'essenziale - Before we are born" 10a edizione italiana – Ed. Piccin</i></p>
<p>Rating</p>	
<p>Modalities of learning verification</p>	<p><i>The examination is conducted in written and oral form on the entire Histology and Embryology program.</i></p>
<p>Criteria for assessment of learning and assignment of final grade</p>	<p><i>Learning will be rated from a minimum of 18/30 to a maximum of 30/30.</i></p>