

## Degree Course in Dentistry and Dental Prosthetics

### **INTEGRATED COURSE: HISTOLOGY**

**SSD: BIO/17**

**COORDINATOR: MASSIMIANI MICOL      E-MAIL: [micol.massimiani@unicamillus.org](mailto:micol.massimiani@unicamillus.org)**

MODULE: Histology

NUMBER CFU: 8

SSD: BIO/17

LECTURERS:

Massimiani Micol e-mail: [micol.massimiani@unicamillus.org](mailto:micol.massimiani@unicamillus.org) / reception by appointment

Campagnolo Luisa e-mail: [luisa.campagnolo@unicamillus.org](mailto:luisa.campagnolo@unicamillus.org) / reception by appointment

Lacconi Valentina e-mail: [valentina.lacconi@unicamillus.org](mailto:valentina.lacconi@unicamillus.org) / reception by appointment

### **PREREQUISITES**

Although there are no propaedeutic requirements, basic concepts of cell biology are required.

### **LEARNING OBJECTIVES**

Aim of the integrated course of Histology is to provide students with knowledge on the physiological organization and development of cells and tissues. During the Histology lectures fundamentals of cytology are discussed for the full understanding of the organization of tissues and their development. The organization of cells and extracellular matrix and their association in the organization of the different tissues is illustrated and discussed, together with the standard histological procedures, including microscopy approaches (optics, fluorescence and electronics), as a tool for the study of structure and development of the human organism.

### **LEARNING OUTCOMES**

#### **Knowledge and understanding**

At the end of the course of Histology the student should have acquired:

- Knowledge on the structure of the various tissues forming the human organism
- Knowledge on the histological organization of the various human organs
- Ability to recognize the morphology of tissues and the cells that compose them, from a morphological and functional point of view
- Ability to recognize and describe the microscopic organization of tissues and organs, and the processes leading to their formation during development
- Ability to synthesize and correlate the various topics.

#### **Applying knowledge and understanding**

At the end of the course the student should be able to:

- Recognize and contextualize microscopic information.
- Understand the relationship between cells and the extracellular matrix underlying the organization of the different tissues of the multicellular organism.
- Apply the knowledge of histology and embryology to the subsequent study of physiology, anatomy, pathological anatomy and clinical disciplines.

### **Communication skills**

At the end of the course the student should be able to use a correct scientific terminology to identify, at the microscopic level, the different types of cells and tissues present in the human body and the mechanisms of their formation during embryonic development.

### **Making judgements**

At the end of the course the student should autonomously interpret histological slides and describe the processes of embryogenesis.

## **COURSE SYLLABUS**

### **Elements of Cytology (Prof. Lacconi Valentina)**

Structural-functional organization of the eukaryotic cell.

Plasma membrane.

Rough and smooth endoplasmic reticulum.

Golgi apparatus and vesicle trafficking.

Lysosomes and peroxisomes.

Mitochondria.

Cytoskeleton and centrioles.

Nuclear membrane.

Nuclear matrix.

Chromatin. Nucleolus.

### **Histology (Prof. Massimiani Micol)**

Introduction to tissues and their study.

Embryonic and adult stem cells, reprogramming of somatic cells into pluripotent stem cells (iPS): concepts, definition and potential for tissue regeneration and repair.

Cell differentiation and histogenesis of tissues.

Epithelia: cell surface specializations and cell polarity. Lining epithelia. Glands (endocrine and exocrine).

Connective tissues: general structure and function of connective tissue; extracellular matrix, fibers, ground substance and cells.

Cartilage: types of cartilage; chondrogenesis and cartilage growth.

Bone: bone structure and function. Osteogenesis; bone remodelling and homeostasis.

Blood: plasma, erythrocytes, leucocytes, platelets. Hemopoiesis.

Immune system and lymphatic organs.

Muscle tissues: structure and function of the skeletal, cardiac and smooth muscle.

Nervous tissue: neurons. Neuroglia. Nerve fibers. Synapses. Neuro-muscular junction.

### **Practice histology (Prof. Massimiani Micol and Prof. Lacconi Valentina)**

Through the use of the optic microscope students will have to identify histological specimens, describe their organization, and correlate structure with function, at cellular and tissue level. Histological specimens to be studied are:

- Simple boundary epithelium: squamous (mesothelium, endothelium), cuboidal (glandular ducts) and columnar (intestine) epithelia.
- Stratified boundary epithelium: squamous (esophagus) and keratinized squamous (epidermis) epithelia
- Pseudostratified epithelium (trachea)
- Transitional epithelium (ureter)
- Glandular epithelium: intraepithelial, unicellular glands (the goblet cell); examples of exocrine (salivary glands) and endocrine (thyroid, parathyroids) glands; exo/endocrine gland: the pancreas.
- Connective tissue: loose connective tissue (trachea, intestine and esophagus); dense irregular connective tissue (the skin); dense regular connective tissue (tendons).
- Supportive connective tissues: tracheal cartilage and compact bone (ground and H&E)
- Blood smear
- Lympho-epithelial tissue of the thymus
- Skeletal, cardiac and smooth muscle tissues
- Nerve tissue: section of the spinal cord

### **Embryology (Prof. Campagnolo Luisa)**

Spermatogenesis.

Hormonal control of spermatogenesis.

Folliculogenesis and oogenesis.

Hormonal control of folliculogenesis and oogenesis.

Ovarian & uterine cycles.

Fertilization.

First week of development and embryo implantation.

Second week of development and the formation of embryonic disk.

Third week of development and the formation of primitive layers: endoderm, ectoderm and mesoderm.

The notochord and its role in embryo development.

Fourth week of development and the embryonic folding and body cavities.

Placenta and extraembryonic membranes.



Organogenesis. Development of face and buccal cavity.

### **COURSE STRUCTURE**

The Histology course is structured in 68 hours of frontal teaching (divided into lessons of 2 or 4 hours according to the academic calendar) and 12 hours of lab practice, consisting of microscopic analysis of several histologic preparations, including sections of epithelium, lining and glandular, connective tissue proper, adipose tissue, cartilage, bone, blood and lymphatic organs, muscle tissues (skeletal, cardiac and smooth muscles) and nervous tissue (nerve and spinal cord).

### **COURSE GRADE DETERMINATION**

The acquisition of the expected learning results is evaluated through the exam. The exam consists in a written test, followed by an oral examination. The written test consists of about 60 questions, divided in multiple-choice questions, true/false questions and associations. For multiple-choice questions there are 0.5 points for each correct answer and -0.1 for every wrong answer (or not given), for true/false questions there are 0.5 points for each correct answer and -0.5 for every wrong answer, for associations there are 0.4 points for each correct answer and -0.2 for every wrong answer. The final score of the written test will be given by the sum of the partial scores assigned to each question answered correctly. To access the oral exam the student must have scored a minimum of 24 points. The oral exam includes the identification of one/two histologic slides and questions on cytology, histology and embryology.

### **OPTIONAL ACTIVITIES**

In addition to the didactic activity, the student will be given the opportunity to take advantage of tutoring activities, upon request, and to attend seminars.

### **READING MATERIALS**

- Ross M.H. and W. Pawlina: Histology a text and atlas, sixth edition. Wolters Kluwer/Lippincott Williams and Wilkins.
- Schoenwolf, Bleyl, Bauer and Francis-West: Larsen's Human Embryology, 5th edition.