

II year (2nd semester)

Scientific Field	HISTOLOGY AND EMBRYOLOGY	TUTOR	ECTS
BIO/17	Histology and Embryology	Salustri Antonietta	2
BIO/17	Histology and Embryology	De Felici Massimo	1
BIO/17	Histology and Embryology	Klinger Francesca Gioia	3
BIO/17	Histology and Embryology	Campagnolo Luisa	3
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**SALUSTRI A.
COORDINATOR****SPECIFIC AIMS**

The aim of the Histology and Embryology integrated course is to provide the necessary knowledge on the organization and development of cells and tissues. Through different microscopy approaches (optic and electronic), structure and development of mammalian organisms are investigated, allowing to acquire information fundamental for the subsequent study of physiology, pathologic anatomy, pathologic physiology and clinical disciplines.

Through the integrated study of Cytology, Histology and Embryology, the student will learn: the microscopic anatomy of cells, tissues and organs, with an emphasis on the relationships between structure and function; to describe and discuss, using the appropriate terminology, specific morphological organizations; the molecular mechanisms of cell differentiation, histogenesis and embryogenesis, gametogenesis, fertilization and the early stages of embryonic development; the mechanisms and processes of primitive embryonic layers formation; the development of organs and apparatus. Principles and mechanisms of morphogenesis and dysmorphogenesis.


PROGRAM

- Methods used in the study of cells and tissues.
- Structural functional organization of the eukaryotic cell.
- Plasma membrane.

CYTOLOGY

- Rough and smooth endoplasmic reticulum.
- Golgi apparatus and vesicle trafficking.
- Lysosomes and peroxisomes.
- Mitochondria.
- Cytoskeleton and centrioles.
- Nuclear envelope.
- Nuclear matrix.
- Chromatin. Nucleolus.
- Cell cycle regulation and cell death.

PROGRAM

- Introduction to tissues.
- 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 remodeling 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.

TOPICS

- Methods for preparation of histological sections (concepts) (2 hr).

HISTOLOGY LAB.

- preparation of histological sections of selected tissues (practice) (10 hr)
- Seminars (16 hr)
- Evaluation test (2 hr)

HISTOLOGY CLINICAL
PRACTICE.

Microscopic analysis of tissues (25 hr):

- Epithelia, lining and glandular.
- Connective Proper Tissue, Adipose Tissue, Cartilage, Bone.
- Blood and lymphatic organs.
- Muscle tissues (skeletal, cardiac and smooth muscles) and Nervous tissue (nerve and spinal cord).

PROGRAM

- Spermatogenesis.
- Hormonal control of spermatogenesis
- Folliculogenesis and oogenesis

EMBRYOLOGY

- Hormonal control of folliculogenesis and oogenesis.
 - Ovarian & uterine cycles
 - Fertilization.
 - First week of development and implantation embryo.
 - Embryonic and adult stem cells, somatic cell reprogramming into pluripotent stem cells (iPS): concepts, definition and potentiality for tissue regeneration and repair.
 - 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:
- Integumentary system
 - Head and neck
 - Oropharyngeal apparatus
 - Gut
 - Respiratory system
 - Urogenital system
 - Skeleton and muscle system
 - Nervous system
 - Cardiovascular system

TEXTBOOKS

A choice of different textbooks (in alphabetical order): Students are encouraged to choose a Histology textbook and an Embryology textbook.

- HISTOLOGY (including essential Cytology):

Ross MH & Pawlina W, Histology: a Text and Atlas, Lippincott Williams & Wilkins, 2010

Gartner LP & Hiatt JL, Color Textbook of Histology, Lippincott Williams & Wilkins, 2009

Young B & Others, Wheather's Functional Histology. Churchill Livingstone Elsevier, 2006.

- EMBRYOLOGY :

Shoenwolf G.C. Larsen's Human Embryology, Churchill Livingston Elsevier, 2009

Moore K.L. The developing Human. Clinically oriented Embryology, Saunders Elsevier, 9th ed.

Sadler T.W. Langman's Medical Embryology, Lippincott Williams & Wilkins, 2010.

Bruce M. Carlson Human Embryology and Developmental Biology, Mosby Elsevier, 2009

- Reference & supplementary books:

Alberts and others, Molecular Biology of the Cell, Garland Science, 2008.

Ross MH, Pawlina W & Barnash TA, Atlas of descriptive Histology, Sinauer Associates, 2009

Eroschenko VP, Di Fiore's Atlas of Histol. with funct. correl., Lippincott Williams & Wilkins, 2007

Gartner LP & Hiatt JL, Color Atlas of Histology, Lippincott Williams & Wilkins, 2009.

EXAM METHOD

The final exam consists in a practical test of microscopic identification of tissues and an oral examination on cytological, histological and embryological topics.

EXAM COMMISSION

The Coordinator, full Professors of the disciplines, Professors of similar disciplines, Specialists of the subject, compose the exam Commission of the Integrated Course.

Salustri Antonietta, President
De Felici Massimo
Klinger Francesca Gioia
Campagnolo Luisa

CONTACTS

Salustri Antonietta	salustri@med.uniroma2.it	0672596168
De Felici Massimo	defelici@uniroma2.it	0672596156
Klinger Francesca Gioia	klinger@uniroma2.it	0672596166
Campagnolo Luisa	campagno@uniroma2.it	0672596154

PREREQUISITES: Previous knowledge and competence in the following subjects:
Human Anatomy1, Chemistry and Introductory Biochemistry.

The specific learning outcomes of the program are coherent with the general provisions of the Bologna Process and the specific provisions of EC Directive 2005/36/EC. They lie within the European Qualifications Framework (Dublin Descriptors) as follows:

1. **Knowledge and Understanding**

- From the observation of macroscopic morphology of the human body structure, combined with observation of the microscopic structure of a variety of human cells, tissues, organs, etc., through the microscope, build the cognitive concepts for cells, tissues, and organs composing the human body system and structure and further combine structure with function.
- Recognize the structural components of the cell, their function and how this correlates with the maintenance of equilibrium at organ, tissue and systemic level.
- Understand the characteristics, function and use of STEM CELLS with regard to their exploitation in the setting of tissue and organ repair. Understand their potential present and future use in medical research.
- Analyze the stages of embryo development, focusing on the genesis of each organ.
- Demonstrate knowledge about established and evolving medicine, being aware of the usefulness of an up-dated education.

2. **Applying Knowledge and Understanding**

- Participate in the study or discussion of slides via four-headed microscope; discuss the findings of the case with the teachers responsible for the individual cases, and make important contributions to the interpretation of the findings.
- Approach to the use of microscopes, in particular the light microscope.
- Provide a proper description of a case based on specific macroscopic and microscopic examination.
- Learn the practical aspects of the pathologic diagnostic instruments, when to use them and how to perform them.
- Learn to interpret appropriate laboratory and diagnostic studies.

3. **Making Judgements**

- Recognize the importance of an in-depth knowledge of the topics consistent with proper medical education.
- Identify the fundamental role of proper theoretical knowledge of the subject in the clinical practice.

4. **Communication Skills**

- Present the topics orally in an organized and consistent manner.
- Use of proper scientific language coherent with the topic of discussion.

5. **Learning Skills**

- Identify the possible use of the acknowledged skills in the future career.
- Assess the importance of the acquired knowledge in the overall medical education process.