

Course Title	<b>Histology I</b>				
Course Code	<b>MED-202</b>				
Course Type	Required				
Level	Undergraduate				
Year / Semester	Year 2/ Semester 3 (Fall)				
Teacher's Name	<b>Course Lead:</b> Prof Stavros Malas				
ECTS	6	Lectures / week	2	Laboratories / week	1.5
Course Purpose and Objectives	<p>The main objectives of this course are:</p> <ul style="list-style-type: none"> <li>• To acquire a basic background in histology and to understand the properties of cells and their interactions with one another as components of tissues and organs.</li> <li>• To understand how structure and function correlate at the microscopic level.</li> <li>• To be able to describe the normal structure and function of various cell types, tissues, and organs, and to differentiate their histological structures from each other through examination.</li> <li>• To acquire basic background on embryology and to understand the first weeks of development.</li> <li>• To describe the growth of the foetus and the maturation of the organ systems.</li> <li>• To discuss the clinical correlations of birth defects for each organ system development.</li> </ul>				
Learning Outcomes	<p><b>Week 1</b></p> <p><b><i>LOBs covered during lectures:</i></b></p> <p><b>Histology</b></p> <ol style="list-style-type: none"> <li>1. Describe the method of tissue preparation for histological examination.</li> <li>2. Outline the principles of histochemistry and immunohistochemistry.</li> <li>3. Describe the function of the different types of microscopy utilized in histology.</li> </ol> <p><b>Embryology</b></p> <ol style="list-style-type: none"> <li>4. Describe oogenesis (female gametogenesis) and spermatogenesis (male gametogenesis).</li> <li>5. Discuss the first week of development, from the ovarian cycle to cleavage and blastocyst formation.</li> </ol>				

6. Discuss examples of birth defects of the first week development.

***LOB covered during practical:***

7. Outline the different steps taken to prepare a biopsy specimen for visualization.

**Week 2**

***LOBs covered during lectures:***

**Histology**

8. Outline the histological features of plasma membrane, and cellular organelles correlating them with their function.
9. Describe the membranous and non-membranous organelles of the cell.
10. Define the histological characteristics of an apoptotic cell.
11. Identify the different stages of mitosis and meiosis from microscopic images.
12. Explain the distinguishing features of the four major tissue types (epithelial, connective, muscle, nervous).
13. List the different types of epithelial cells and briefly discuss the function of each (apical, lateral, basal).
14. Describe the accessory structural features of epithelial cells such as microvilli, cilia and cell-to-cell contacts.
15. Distinguish between exocrine and endocrine glands and give examples of each.

**Embryology**

16. Discuss the day-by-day development during the second week of gestation (Day 8 – Day 13).
17. Outline the development of embryoblast and trophoblast.
18. Explain what is meant by abnormal implantation and ectopic pregnancy.

**Week 3**

***LOBs covered during lectures:***

**Embryology**

19. Describe gastrulation, and vasculogenesis.
20. Outline the formation of the notochord and the establishment of axes.
21. Briefly discuss teratogenesis and birth defects associated with laterality.

***LOB covered during practical:***

22. Identify the different types of epithelial tissue under the microscope

#### **Week 4**

##### ***LOBs covered during lectures:***

##### **Histology**

23. List the classification of connective tissue and their major histologic features.

24. Describe the two major classes of connective tissue cells.

25. Describe the different components of the ECM and their microscopic features.

26. Briefly discuss the characteristics of special connective tissue.

##### **Embryology**

27. Discuss the derivatives of the ectodermal germ layers and their defects.

28. Discuss the derivatives of the mesodermal germ layers and their defects.

29. Discuss the derivatives of the endodermal germ layers and their defects.

##### ***LOB covered during practical:***

30. Identify the different types of connective tissue under the microscope.

#### **Week 5**

##### ***LOBs covered during lectures:***

##### **Histology**

31. Describe the histology and function of the different layers of the heart.

32. Outline the different microscopic features of arteries and veins.

33. Identify the differences between different types of arteries (from elastic artery to arteriole) and veins (from large vein to venule).

##### **Embryology**

34. Discuss the formation of the heart tube.

35. Outline the formation of aorticopulmonary and the atrial septa.

36. Outline the formation of atrioventricular and interventricular septa.

##### ***LOB covered during practical:***

37. Distinguish between artery and vein in a tissue microscopic specimen,

38. Identify heart tissue in a microscopy specimen.

## **Week 6**

### ***LOBs covered during lectures:***

#### **Histology**

39. Describe the histology of the conducting portion of respiratory system (nasal cavity, pharynx, larynx, trachea, bronchi).
40. Discuss the histology of the respiratory portion of the system (intrapulmonary bronchial tree, bronchioles, and alveoli).

#### **Embryology**

41. Describe the formation of the gut tube, the body cavity and the thoracic cavity.
42. Describe the formation of the upper and lower respiratory system
43. Describe the clinical correlations of heart development including genetic abnormalities, laterality and cardiac looping abnormalities, valve and outflow tract defects and arterial system defects.

### ***LOB covered during lab practical:***

44. Distinguish between the trachea, bronchi and bronchiole in a microscopic specimen.

## **Formative Midterm Exam**

## **Week 7**

### ***LOBs covered during lectures:***

#### **Histology**

45. Describe the general histological features of the tongue, and the salivary glands.
46. Describe the general histological morphology of the teeth.
47. Outline the different histological features of the upper GI tract (oesophagus and stomach) and describe the function of the accessory cells.
48. Outline the different histological features of the lower GI tract (small and large intestine, rectum) and describe the function of the accessory cells.

#### **Embryology**

49. Outline the derivatives of the foregut, midgut and hindgut.
50. Discuss the formation of the mesenteries and the anal canal.

### ***LOB covered during lab practical:***

51. Identify the histological features of tongue, glands, oesophagus, stomach, small and large intestine tissue by microscopic examination.

## Week 8

### **LOBs covered during lectures:**

#### Histology

52. Explain the two models that describe the structure of the liver with regards to functional units (lobule vs acinus).
53. Describe the zonal distribution of hepatocytes and its functional significance.
54. Outline the major morphological features of the gallbladder and pancreas.

#### Embryology

55. Discuss the development of foetus.
56. Outline the structure of the placenta and its components (decidua basalis and villous chorion).
57. Outline structure of the umbilical cord, and amniotic fluid.
58. Discuss birth defects related to placenta and cord development.

### **LOB covered during lab practical:**

59. Identify the microscopic architecture of the liver based on the lobular and acinus model.
60. Identify the histological features of the gallbladder and the pancreas.

## Week 9

### **LOBs covered during lectures:**

#### Histology

61. Describe the major histological features of the pituitary gland, hypothalamus and pineal gland.
62. Outline the three classes of hormones secreted by the endocrine system.
63. Describe the general mechanism of hormone secretion regulation.

#### Embryology

64. Outline changes at the end of pregnancy, and time of birth.
65. Describe birth defects and their prevention: types of birth defects – factors influencing birth defects – in vitro fertilization. Describe methods of prenatal diagnosis and assessment of foetal development: ultrasonography, maternal serum screening, amniocentesis, chorionic villus sampling – Fetal therapies
66. Describe methods of prenatal diagnosis and assessment of foetal development such as ultrasonography, maternal serum screening, amniocentesis, chorionic villus sampling, as well as foetal therapies.

***LOB covered during lab practical:***

67. Differentiate between principal cells and oxyphil cells in the parathyroid gland.

**Week 10**

***LOBs covered during lectures:***

**Histology**

68. Describe the major histological features and general function of the thyroid gland.
69. Describe the histology and function of the parathyroid gland.
70. Describe the major histological features and general function of adrenal glands.

**Embryology**

Revision

***LOB covered during lab practical:***

71. Distinguish between the zona glomerulosa, zona fasciculata, zona reticularis and medulla of the adrenal gland.
72. Identify the histological features of thyroid and parathyroid glands.

**Week 11**

***LOBs covered during lectures:***

**Histology**

73. Outline the different cell types found in the blood and describe their morphological features.
74. List the different stages of haemopoiesis.
75. Describe the histological features of the lymphatic vessels.
76. Describe the histological features of the spleen, thymus and lymph node.

**Embryology**

Revision

***LOB covered during lab practical:***

77. Identify the major types of cells in a blood smear.
78. Identify the structure of spleen, thymus and lymph nodes in a microscopic specimen.

	<b>Week 12</b> <b>Histology</b> Revision		
Prerequisites	None	Required	None
Course Content	<p><b>Topics covered in lectures</b></p> <p><b>Histology</b></p> <ul style="list-style-type: none"> <li>• Introduction to Histology</li> <li>• Human Cell: Histological features of organelles and cellular processes</li> <li>• Tissues: Concepts and Classification <ul style="list-style-type: none"> <li>○ Epithelial Cells and Glands</li> <li>○ Connective Tissue and ECM</li> </ul> </li> <li>• Cardiovascular System</li> <li>• Respiratory System</li> <li>• Gastrointestinal System <ul style="list-style-type: none"> <li>○ Digestive System I (Tongue, teeth and salivary glands)</li> <li>○ Digestive System II (Oesophagus, Stomach, Small Intestine, Large Intestine and Rectum)</li> <li>○ Digestive System III ( Liver, Gallbladder and Pancreas)</li> </ul> </li> <li>• Endocrine System <ul style="list-style-type: none"> <li>○ Overview of the Endocrine System</li> <li>○ Pituitary Gland/ Hypothalamus/ Pineal Gland</li> <li>○ Thyroid and Parathyroid Gland and Adrenal Gland</li> </ul> </li> <li>• Haemopoietin and Lymphoreticular System <ul style="list-style-type: none"> <li>○ Blood</li> <li>○ Lymphatic System</li> </ul> </li> </ul> <p><b>Embryology</b></p> <ul style="list-style-type: none"> <li>• Introduction to embryology and first week of development</li> <li>• Second week of development: bilaminar germ disc</li> <li>• Third week of development: trilaminar germ disc</li> <li>• The embryonic period: the three germ layers</li> <li>• Heart development</li> <li>• The gut tube and the body cavities</li> <li>• Respiratory development</li> <li>• Gastrointestinal development.</li> </ul>		

	<ul style="list-style-type: none"> <li>• Foetus and the placenta</li> <li>• Birth defects and prenatal diagnosis.</li> </ul> <p><b>Topics covered in laboratory practicals</b></p> <ul style="list-style-type: none"> <li>• Microscopy Training</li> <li>• Histology of Epithelial Cells and Glands</li> <li>• Histology of Connective, Muscle and Nervous Tissue</li> <li>• Histology of the Cardiovascular System</li> <li>• Histology of the Respiratory System</li> <li>• Histology of Digestive System</li> <li>• Histology of the Endocrine System</li> <li>• Histology of the Hematopoietic and Lymphoreticular System</li> </ul>																														
Teaching Methodology	Lectures, Laboratory Practical Sessions.																														
Bibliography	<p><b>Required Textbooks/Reading:</b></p> <table border="1"> <thead> <tr> <th>Authors</th> <th>Title</th> <th>Edition</th> <th>Publisher</th> <th>Year</th> <th>ISBN</th> </tr> </thead> <tbody> <tr> <td><a href="#">Wojciech Pawlina,</a> <a href="#">Michael H. Ross</a></td> <td>Histology: A Text and Atlas  with correlated cell and molecular biology</td> <td>7<sup>th</sup> Int'l Edition</td> <td>Wolters Kluwer/ Lippincott Williams &amp; Wilkins</td> <td>2015</td> <td>9781469889313</td> </tr> <tr> <td>Sadler, Thomas</td> <td>Langman's Medical Embryology</td> <td>13<sup>th</sup> Int'l Edition</td> <td>Wolters Kluwer/ Lippincott Williams &amp; Wilkins</td> <td>2015</td> <td>9781469897806</td> </tr> </tbody> </table> <p><b>Recommended Textbooks/Reading:</b></p> <table border="1"> <thead> <tr> <th>Authors</th> <th>Title</th> <th>Edition</th> <th>Publisher</th> <th>Year</th> <th>ISBN</th> </tr> </thead> <tbody> <tr> <td>Young, Barbara</td> <td>Wheater's functional histology: a text and colour atlas</td> <td>6<sup>th</sup> Edition</td> <td>Churchill Livingstone/Elsevier</td> <td>2014</td> <td>978070204</td> </tr> </tbody> </table>	Authors	Title	Edition	Publisher	Year	ISBN	<a href="#">Wojciech Pawlina,</a> <a href="#">Michael H. Ross</a>	Histology: A Text and Atlas  with correlated cell and molecular biology	7 <sup>th</sup> Int'l Edition	Wolters Kluwer/ Lippincott Williams & Wilkins	2015	9781469889313	Sadler, Thomas	Langman's Medical Embryology	13 <sup>th</sup> Int'l Edition	Wolters Kluwer/ Lippincott Williams & Wilkins	2015	9781469897806	Authors	Title	Edition	Publisher	Year	ISBN	Young, Barbara	Wheater's functional histology: a text and colour atlas	6 <sup>th</sup> Edition	Churchill Livingstone/Elsevier	2014	978070204
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	Kierszenbaum Abraham	Histology and Cell Biology: An Introduction to Pathology	4 <sup>th</sup> Edition new	Elsevier/Sanders	2015	9780323313308	
	Gartner L.P. & Hiatt J.L.	BRS Cell Biology and Histology	7 <sup>th</sup> Edition	Wolters Kluwer	2014	9781451189513	
	Dudek R.W.	BRS Embryology	6 <sup>th</sup> Edition	Wolters Kluwer	2014	9781451190380	
Assessment	For course MED-202 Histology I there will be an online Formative Midterm Exam. The grade for the course will be contributed by a Lab Report (10%) and a Summative Final Exam (90%). Written exams consist of Single Best Answer MCQs (SBAs) and Short Answer Questions (SAQs).						
Language	English						