



**Department of Biology**

**College of Education**

**Salahaddin University**

**Subject: Histology and Embryology**

**Theoretical part: 2hrs.**

**Course Book – 2<sup>nd</sup> year**

**Code:EdB0201**

**Lecturer's name: Assist. Prof .Dr . Treefa Farouq Ismail**

**Academic Year: 2022/2023**

# Course Book

1. Course name	Histology and Embryology BE201
2. Lecturer in charge	Treefa Farouq Ismail
3. Department/ College	Biology Dept./ Education College
4. Contact	e-mail: <a href="mailto:treefa.ismail@su.edu.krd">treefa.ismail@su.edu.krd</a>
5. Time (in hours) per week	10
6. Office hours	7
7. Course code	EdB0201
8. Teacher's academic profile	<p>Graduated from Education College for science / Salahadeen University Erbil – Iraq. 1993 – 1994.</p> <p>- M.S.D (High Education) _ in Education College for science / Salahadeen University Erbil - Iraq. 2003. Specialized in biology / histology.</p> <p>The main subjects in the master degree: -</p> <ol style="list-style-type: none"> <li>1. In the first semester: advance ecology, advance biochemistry, biostatics and computer skills.</li> <li>2. In the second semester: biotechnical, molecular biology, advance genetic, advance histology and advance embryology.</li> </ol> <p>-PhD in cell biology 2013 (Education College for science / Salahadeen University Erbil – Iraq).</p> <p>The main subjects the PhD courses were: -</p> <ol style="list-style-type: none"> <li>1. In the first semester: Molecular Genetics, Advance Immunology, Advance Biochemistry, Advance Biotechnology and Cell Physiology.</li> <li>2. In the second Semester: Advance Cell Biology, Cell Physiology, Environment Toxicology, Histopathology and Seminar.</li> </ol> <p><b>Publication:</b></p> <ol style="list-style-type: none"> <li>1- Effect of Ethinylestradiol on testis of albino rats (<i>Ratus Narwegecus</i>). Treefa Farouq Ismail &amp; Suhayla Wasman Qadir (2007)</li> <li>2- Histological effect of Ethinylestradiol on Lung of Albino Rats (<i>Ratus Narwegecus</i>). Treefa Farouq Ismail (2007)</li> <li>3- Effects of Fenugreek Seeds Extract on Sperm Production and Body Weight in Male Albino Mice (<i>Mus Musculus</i>). Karim R. Hamad, Mustafa S. M. Al-Attar, Treefa F. Ismail (2008)</li> </ol>

	<p>4- Anti-urolithiatic effect of Fenugreek in ethylene glycol-induced kidney calculi in rat. Mudhir S. Shekha, Trifa F. Ismail and Falah M. Aziz (2015)</p> <p>5- Curative effects of Pomegranate and Ginger on hepatic and renal functions of indomethacin-induced peptic ulcers in albino rats Mudhir S. Shekha, Muhsin J. Abulwahid, Peshraw S. Hamadamin, Trifa F. Ismail, Saman R. Hamad bakir, Laween M. Ibrahim, Lana M. Ahmed (2017)</p> <p>6- Histological effect of methomyl on rat brain and testis. Treefa Farouq Ismail (2017)</p> <p>7- The protective effect of omega-3 oil against the hepatotoxicity of cadmium chloride in adult and weanling rats. Treefa F. Ismail, and Falah M. Aziz (2017)</p> <p>8- Physiological and histological study of the effect of Cumin Cyminum watery extract and vitamin E on the male reproductive system in rats exposed to oxidative stress. Othman Aeed Saleh Alfahdawi, Muneef Saab Ahmed Aljanabi and Treefa Farouq Ismail (2018)</p> <p>9- Omega-3 Oil Ameliorate Histological and Ultrastructural Alterations Induced by Cadmium Chloride in Rats Testis. Treefa F. Ismail and Falah M. Aziz (2020)</p> <p>10- The effect of Schiff Base [N-N(Ethane-1,2-Diyl) Bis (1-Phenyl methanimine)] on pathogenic bacteria induced histological changes in rats liver and kidney. Sawsan Mohammed Al-Sorchee, Treefa Farouq Ismail, Israa Mahmood Mohammed and Aeed Salih Alfahdawi (2020)</p> <p>11- Study the Effects of Formaldehyde and Xylene Vapor on Lung and Testicular Tissue with Sperm Morphology of Adult Albino Rats Treefa F. Ismail, Galawezh O. Othman, Naznaz H. Othman, Ban A. Hasan (2021)</p> <p><b>12-</b> Hepato-defensive effect of Cysteine, Ursodeoxycholic acid and Silymarin on histopathological and some biochemical parameters of Wister albino rat intoxicated by CCl<sub>4</sub> Treefa Farouq Ismail, Hero Muhammed Saed, Zeyan Abdullah Ali and Sarwar Nawzad Jafar</p>
<p><b>9. Keywords</b></p>	

#### 10. Course overview:

Each lecturer utilizes histological structural biological approach, emphasizing the specialized properties and activities of the basic tissue components as the key to understanding the functions of each organ, structure and functions of these organs at the cellular level also understands basic histological techniques such as specimen preparation and microscopy ability to differentiate between routine H & E & other special.

As well as offers a comparative survey of the structure and functioning of the chordates with emphasis on the vertebrates as well as includes a laboratory and microscopic study of the anatomy of selected vertebrates. Also provides an introduction to animal development through the study of reproduction, early embryology, Histogenesis, organogenesis, and morphogenesis. The roles of determination, differentiation, growth, morphogenesis, and pattern formation will be emphasized to know both the traditional taxonomy & major clades to which the embryos belong.

In the lab sections the students should be able to:

1. Proper handling the light microscope (&other special techniques) &use it to study cell& tissue
2. Microscopic Identification of various types of normal cells
3. Microscopic Identification of the histology of various types of normal body organ systems
4. Understanding the structure, organization & function of different organ systems in the body
5. Ability to differentiate between routine H & E & other special Stains
6. Be able to identify the following in embryo:
  - a. Relative amount of yolk in eggs: Microlecithal, Mesolecithal, Macrolecithal
  - b. Cleavage patterns: holoblastic, meroblastic & discoidal.
  - c. Identify these developmental stages & associated structures in embryonic frog development.

#### 11. Course objective:

A- This section meets the following programmatic goals for the B.S. Biology degree program:

- To give general histological principles through the study of structure and function of each type of tissue.
- Proper Handling the light microscope (&other special techniques) &use it to study cell& tissue
- Microscopic Identification of various types of normal cells
- Microscopic Identification of the histology of various types of normal body organ systems
- Understanding the structure, organization & function of different organ systems i the body
- To show how the tissue sectioned and examined under microscopy.
- To provide required knowledge of animal biology systems and organismal levels.
- Be able to identify the following in embryo:
  - Relative amount of yolk in eggs: Microlecithal, Mesolecithal, Macrolecithal
  - Cleavage patterns: holoblastic, meroblastic & discoidal.
  - Identify these developmental stages & associated structures in embryonic frog development.

At the end The students should be able to:

- Critical Thinking:
  - Differentiate between disease and normal cell

Content:

- 1- Identify the primary cell types of each organ in the human body at the light and electron microscopic levels
- 2- Identify the primary stains used in identifying normal and diseased cells and describe the chemistry of the staining process.
- 3- Identify and describe the function of all major cellular organelles.

B-1-Know both the traditional taxonomy & major clades to which the embryos belong.

- a. Know at least 1 shared derived trait that can “define” each clade.

**2. Be able to identify the following in e embryo:**

a. Relative amount of yolk in eggs: microlecithal, mesolecithal, macrolecithal

b. Cleavage patterns: holoblastic, meroblastic & discoidal.

c. Identify these developmental stages & associated structures in embryonic frog development:

i. Fertilized egg or zygote: animal & vegetal pole

ii. Blastula (blastocoel, micromeres & macromeres)

iii. Gastrula (blastocoel, archenteron, notochord, yolk plug, blastopore, anterior vs posterior regions)

iv. Neurula (neural plate & neural folds, anterior vs posterior regions)

d. In the chick find these homologous structures to the blastopore: Hensen's node & primitive streak.

e. Primary germ layers (ectoderm, mesoderm or endoderm) & examples of adult tissues each may form.

i. Identify the 3 major types of mesoderm: epimere (somites), mesomere (intermediate) & hypomere (lateral plate mesoderm). Give an example of an adult tissue that is derived from each type.

f. Identify these structures or organs in both frog & chick embryos, as noted: eye, lens, otic capsule, notochord, somites, neural tube or neural folds, brain, pharyngeal arches and heart.

g. Identify these additional organs in the tadpole (they remain small or difficult to see in early chick stages): liver, kidney, and gut or intestine.

3. Compare the amphioxus specimens to the frog & chick embryos.

4. Leads students toward understanding of the male and female reproductive system.

To identified gametes production and fertilization.

**12. Student's obligation**

Success in a histology and embryology depends on the student's understanding of the objectives. These are:

- To learn microscopic anatomy of the tissues and organs of the human body.
- To learn histological terms and concepts for the purpose of identification and precise communication.
- To develop a systematic thinking process as a means to identify histological preparations correctly.
- To understand the relationship between microscopic structure and function.
- To understand the preparative procedures used in histology and how they affect the visual image.

By methodically reviewing images in this database they will learn to identify cells, tissues, organs, and parts of organs correctly. So learn to do this, not by memorizing the images, rather, by learning how morphological features relate to function and by understanding which features are most diagnostic of organ systems and organs of the systems. In medicine, physiology, Biochemistry as in histology, this intellectual process involves art as well as science. The art lies in knowing which questions to ask, and in what order, in our systematic process of elimination.

The students are required to do closed book exam at the mid and end of the semester. As well as required to do report on different type of tissues and structural systems, in addition to do weekly home work.

**13. Forms of teaching**

Consistent internet access and email capabilities. This course is partially online. All instructional content and interaction takes place over the WWW. In addition to baseline word processing skills and sending/receiving email with attachments, students will be expected to search the internet and possibly upload / download files. In addition, students may need one or more of the following plug-ins to view or access certain files (follow the links to download the plug-ins):

• Adobe Acrobat Reader: <http://www.adobe.com/products/acrobat/readstep2.html> required to open many web-based text documents in a format easy to read and print.

• PowerPoint Viewer: <http://microsoft.com/downloads/details.aspx?FamilyId=D1649C22-B51F-4910-93FC-4CF2832D3342&displaylang=en> Required . This viewer allows to open the PowerPoint presentations in this course and then be able to print them in multiple formats.

•MacromediaFlashPlayer:[http://www.macromedia.com/shockwave/download/download.cgi?P1\\_Prod\\_Version=ShockwaveFlash](http://www.macromedia.com/shockwave/download/download.cgi?P1_Prod_Version=ShockwaveFlash) required to open any animations that may be in the course.

Books and URL that students have to depend on in this course

- 1) Leslie P. Gartner & Janes L. Hiatt (2014). Color Atlas and Text of Histolog 6th Edition.
- 2) Junqueira,L.C. & Carneiro. J. (2013). Basic Histology: Text&Atlas.13th Edition.
- 3) William J. Krause (2005). Krause's Essential Human Histology for Medical Students 3rd Edition
- 4) Kuehnel (2004). Color Atlas of Cytology, Histology and Microscopic Anatomy 4th Edition.
- 5) <http://www.histologyguide.org>.

#### GENERAL

Cell & Developmental Biology Online! 2009. Univ. of Guelph, Zoology Dept.

<http://www.uoguelph.ca/zoology/devobio/dbindex.htm>

Mallery, C. 2009. Animal Development. Biol. 150. Univ. of Miami.

[http://www.bio.miami.edu/~cmallery/150/devel/animal\\_development.htm](http://www.bio.miami.edu/~cmallery/150/devel/animal_development.htm)

Nouvelles Technologies Educatives del l'universite de Lyon1. 2000. Atlas d'embryologie descriptive des vertébrés.

<http://nte-serveur.univ-lyon1.fr/nte/embryon/tp2000/correction.htm>

PBS. 2008. Morphing Embryos. Odyssey of Life. (Quicktime videos of embryos)

<http://www.pbs.org/wgbh/nova/odyssey/clips/>

Slonczewski, J. 2009. Chapter 14. Gastrulation & Neurulation. Biology 114, Biology Dept., Kenyon College

[http://biology.kenyon.edu/courses/biol114/Chap14/Chapter\\_14.html](http://biology.kenyon.edu/courses/biol114/Chap14/Chapter_14.html)

Univ. of Calgary. 2000. The Virtual Embryo.

[http://people.ucalgary.ca/~browder/virtualembryo/db\\_tutorial.html](http://people.ucalgary.ca/~browder/virtualembryo/db_tutorial.html)

Wasserman, B. Movies/Pics. Bill Wasserman's Developmental Biology Page, Loyola Univ., Chicago.

<http://www.luc.edu/faculty/wwasser/dev/devm.htm>

#### CHICK ONLY

Burke, AC. 2009. Body wall formation in the chick embryo. Learning Objects Team, Wesleyan University.

[http://learningobjects.wesleyan.edu/musc\\_dev/](http://learningobjects.wesleyan.edu/musc_dev/)

Cebra-Thomas, J. 2003. Chick Embryo Staging. Developmental Biology, Swarthmore Univ.

[http://www.swarthmore.edu/NatSci/sgilber1/DB\\_lab/Chick/chick\\_stage.html](http://www.swarthmore.edu/NatSci/sgilber1/DB_lab/Chick/chick_stage.html)

DevBio.com 2009. Coelom Formation (animation). Developmental Biology Online. Companion to Developmental Biology,

8th Edition by Scott F. Gilbert, Sinauer Associates. <http://8e.devbio.com/article.php?ch=15&id=138>

Gilbert, SF. 2000. Early Development in Birds. Cleavage in Bird Eggs. Developmental Biology, 6th Ed.

<http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=dbio&part=A2581>

Hill, M. 2008. Embryology: Chicken Development Stages. Univ. of New South Whales Embryology.

<http://embryology.med.unsw.edu.au/OtherEmb/chick2.htm>

Muneoka, K. 2006. Online Developmental Atlas. CELL 413 - Embryology Lab., Dept. of Cell & Mol. Biol., Tulane Univ.

<http://www.tulane.edu/~embryo/labsyllabus.htm>

Shaw, M. 2005. Gametogenesis & Development. Univ. of Manitoba - series of labeled chick slides with descriptions

[http://www.umanitoba.ca/faculties/science/biological\\_sciences/lab14/biolab14\\_4.html](http://www.umanitoba.ca/faculties/science/biological_sciences/lab14/biolab14_4.html)

Temkin, M. 2001. Atlas of Developmental Stages, Developmental Biology - 31 St. Lawrence Univ.

<http://it.stlawu.edu/~mtem/devbiol/db99atlas.htm>

Univ. of Illinois Urbana-Champaign. 1998. Chickscope (Go into a stage to find great microscopic views!)

<http://chickscope.beckman.uiuc.edu/explore/embryology/>

#### FROG ONLY

Cebra-Thomas, J. 2003. Xenopus Embryo Staging. Developmental Biology, Swarthmore Univ.

[http://www.swarthmore.edu/NatSci/sgilber1/DB\\_lab/Frog/frog\\_staging.html](http://www.swarthmore.edu/NatSci/sgilber1/DB_lab/Frog/frog_staging.html)

Frontiers in Bioscience. 2007. Germ Layer Derivatives. Atlas of *Xenopus* Embryology

<http://www.bioscience.org/atlas/fert/htm/develhum/5germper.htm>

Kimball, J. 2009. Frog Embryology. Kimball's Biology Pages.

<http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/F/FrogEmbryology.html>

Munson, D. 2009. Histology. (frog images) MCB 116: Experimental Embryology. Harvard Univ.

<http://www.courses.fas.harvard.edu/~mcb116/topics/histology.html>

Sievert, L. 2004. Frog Development Models. Vertebrate Structure and Development, ZO 515 - 516. Emporia State Univ.

<http://academic.emporia.edu/sievertl/verstruc/frmodel.htm>

Univ. of Wisconsin. 2002. Amphibian Embryology Tutorial! (QuickTime movie & more)

<http://worms.zoology.wisc.edu/frogs/welcome.html>

#### 14. Assessment scheme

The students are required to do close book exam mid and final of the semester. As well as required to do report on different type of tissues and structural systems.

IN general:

The students are required to do two closed book exams two times during the academic year

besides the laboratory assignment;

theoretical exams & quizzes: 27%

Laboratory exams & quizzes: 13%

Final Exam: 60%

#### 15. Student learning outcome:

A-Each course consists of almost 11-12 lectures and 3h practical directly related to the lectured material and designed to develop student's practical scientific skills. After completing the course student should be familiar with the basic animal type of tissues and its relation to body systems. I believe that good lecturing must have some entertainment value to keep students awake and interested. To be sure, organization and clarity of presentation are very important, but the delivery needs to be such that students look forward to learning. I try to accomplish this with frequent changes of pace, anecdotes, direct class participation and by conveying my true passion for my work which is relate to function and by understanding which features are most diagnostic of organ systems and organs of the systems. In medicine, physiology, Biochemistry as in histology, this intellectual process involves art as well as science. The art lies in knowing which questions to ask, and in what order, in our systematic process of elimination.

B-the students should be able to:

1. Anatomical and histological descriptions of reproductive system.
2. Describe different type fertilization.
3. Differentiate among different type cleavages.
4. Understanding Gametogenesis.
5. Compare the amphioxus specimens to the frog & chick embryos.

#### 16. Course Reading List and References:

- 1) Leslie P. Gartner & Janes L. Hiatt (2014). Color Atlas and Text of Histolog 6th Edition.
- 2) Junqueira,L.C. & Carneiro. J. (2013). Basic Histology: Text&Atlas.13th Edition.
- 3) William J. Krause (2005). Krause's Essential Human Histology for Medical Students 3rd Edition
- 4) Kuehnel (2004). Color Atlas of Cytology, Histology and Microscopic Anatomy 4th Editio
- 5) Photographic Atlas of Histology, Michael J. Leboffe.William, A.; Beresford, M.A., D. Phil ©Professor of Anatomy Department, WestginiaUniversity, Morgantown, USA .
- 7).Junqueira,L.C. & Carneiro. J. (2005). Basic Histology: Text&Atlas.11ed.

#### 17. Theoretical part: Histology and Embryology BE201, 2nd year Biology students

Lecturer's name

Subject

Course programmed: Subject well be programmed on Sunday  
from 8:30 -10:30 and 10:30 - 12:30 A.M.

Lecturer's name:  
Treefa Farouq  
Ismail (2 hrs)

1.

Introduction to Histology, Cytology review

2.

Simple Epithelia & Stratified Epithelia

3.	<b>Connective tissue I - Blood and Bone Marrow</b>
4.	<b>Connective Tissue II C.T. Proper and Types</b>
5.	<b>Connective Tissue III - Cartilage Connective Tissue and Bone</b>
6.	<b>Muscle Tissue Skeletal , Cardiac, and Smooth</b>
7.	<b>Nerve Tissue : Brain parts ,Neurons ,Neuroglia</b>
8.	<b>Integument (skin) system : thick &amp; thin skin</b>
9.	<b>Circulatory System.</b>
10.	<b>Lymphoid Organs</b>
11.	<b>Digestive System I - Oral Cavity , II - Tract</b>
12.	<b>Digestive System II - Tract &amp; Glands</b>
13.	<b>Urinary System</b>
14.	<b>Respiratory System</b>
15.	<b>Endocrine System I-Pituitary, Thyroid II- Parathyroid, Adrenal</b>
16.	<b>Introduction to the Embryology Gametogenesis: Mitosis, Meiosis and Capacitation, Penetration and Fertilization in human. A Comparative Outline of Oogenesis and Spermatogenesis</b>
17.	<b>Male Reproductive System Male: Testis, Epididymis, Vas, accessory glands, and penis</b>
18.	<b>Female reproductive system: Ovary, ovarian follicle, ovulation, Oviduct, Uterus</b>
19.	<b>Cleavage: Cleavage of Microlecithal Eggs The Amphioxus Cleavage of Mesolecithal Eggs Amphibians Cleavage of Megalecithal Eggs The Chicken</b>
20.	<b>Gastrulation Microlecithal Embryos The Amphioxus Mesolecithal Embryos</b>

	<b>Amphibians</b> <b>Megalecithal Embryos</b> <b>The Chick</b>
21.	<b>The Frog Embryo</b> <b>The Neural Tube Stage Embryo</b> <b>Whole Mount and Diagrams</b> <b>Transverse Sections</b>
22.	<b>The 3-4 MM Frog Embryo</b> <b>Whole Mount</b> <b>Serial Transverse Sections</b> <b>Introduction</b> <b>Begin Serial Sections</b>
23.	<b>The Chick Embryo</b> <b>The 24 and 33Hour Chick Embryo</b> <b>Whole Mount</b> <b>Sagittal Section</b> <b>Serial Transverse Sections</b> <b>Introduction</b> <b>Begin Serial Sections</b>
24.	<b>The 48 Hour Chick Embryo</b> <b>Whole Mount</b> <b>Sagittal Section</b> <b>Diagrams of Aortic Arches and Blood Flow</b> <b>Serial Transverse Sections</b> <b>Introduction</b> <b>Begin Serial Sections</b>
25.	<b>The 72 Hour Chick Embryo</b> <b>Whole Mount</b> <b>Sagittal Section</b> <b>Development and Differentiation of the Neural Tube</b> <b>Serial Transverse Sections</b> <b>Introduction</b> <b>Begin Serial Sections</b>
Subject	<b>18 . Lab part : Histology and Embryology BE201, 2nd year Biology students</b> <b>Course programmed: Subject well be programmed on Tuesday</b> <b>and Wednesday in each day we have 3 labs (Lab part: 3 hrs.)</b>
1.	<b>1.Basic Histological Techniques &amp; Cytology review</b>
2.	<b>Simple &amp; Stratified Epithelia</b>

3.	<b>Bone marrow and blood smears</b>
4.	<b>Areolar, Dense, Fibrous, Adipose, Reticular</b>
5.	<b>Hyaline, Elastic and Fibrous Cartilage Developing Bone and Compact Bone</b>
6.	<b>Skeletal, Cardiac, and Smooth</b>
7.	<b>Nerve Tissue : Brain parts , Neurons</b>
8.	<b>thick &amp; thin skin component &amp; derivative</b>
9.	<b>Heart, Blood Vessels, Lymph Vessels</b>
10.	<b>Lymph Nodes, Thymus, Spleen</b>
11.	<b>Teeth, Tongue, Taste Buds, Oesophagus, Stomach</b>
12.	<b>Intestines &amp; Salivary glands Pancreas, Liver &amp; Gall Bladder</b>
13.	<b>Kidney, Ureter, Urinary Bladder</b>
14.	<b>Lungs, Trachea</b>
15.	<b>Pituitary, Thyroid- Parathyroid, Adrenal,</b>
16.	<b>Gametogenesis: Oogenesis and Spermatogenesis steps.</b>
17.	<b>Male: Testis, Epididymis, Vas deferens accessory glands, and penis.</b>
18.	<b>Female: ovarian follicle, Ovary, oviduct, uterus, menstrual cycle.</b>
19.	<b>Cleavage of Amphioxus, Amphibians and Chick.</b>
20.	<b>Gastrulation of Amphioxus, Amphibians and Chick.</b>
21.	<b>Transverse Sections of Nurlation</b>
22.	<b>Serial Transverse Sections of Whole Mount The 3-4 MM Frog Embryo.</b>
23.	<b>Serial Transverse and Sagittal Section Of Whole Mount The 24 and 33Hour Chick Embryo.</b>
24.	<b>Serial Transverse and Sagittal Section Of Whole Mount The 48 Hour Chick Embryo.</b>
25.	<b>Serial Transverse and Sagittal Section Of Whole Mount The 72 Hour Chick Embryo.</b>

**19. Examinations:**

**Selective examples histology exams.**

**Q1- Tabulate differences between the following with drawing:**

- 1- Merocrine & apocrine sweat gland.
- 2- Main differences among tonsils.
- 3- Gastrulation in Amphioxus & frog.

**Q2- Tick (T, True) or (F, False) to the following statement and then correct the false ones: (30M)**

- 1- Medium sized veins have the thickest layer of tunica adventitia.
- 2- Lymphocyte largest circulating WBC.

**Q3- Fill blanks with suitable scientific words**

1- Simple squamous that lines body cavities and cover organs called----- while simple squamous that lines the inside of blood vessels and capillaries called-----.

2- There are four zones that are identifiable in endochondral ossification -----,-----,-----,----- and-----.

**Q4: Define: Serosa, Brown fat**

**Q5- What are the types of epithelium in the following?**

- a) Skin
- b) Oesophagus
- c) Urinary bladder

**Q3- Enumerate the functions of?**

- a) Skin
- b) Myelin

**Q6- Draw & label pseudo stratified epithelium.**

**Q7- Choose the most appropriate:**

Hibernating animals mostly contain

1. White fat
2. Brown fat
3. Red fibres

#### 4. Epithelium

☐ Skin colour is due to pigment called

1. Hemosiderin
2. Lipofuscin
3. Melatonin
4. Melanin

Q8-Answer with true or false (there is penalty for wrong answers)

1. Lymphoid tissue is found in the intestinal tract
2. The thymus increases in size with age
3. The neutrophils have the highest count in human blood
4. Cardiac muscles have the ability for mitosis
5. Central nervous system includes spinal nerves & ganglia
10. Mention in order the layers of the epidermis.11. Enumerate the types of hair in human.
12. Describe the gross appearance of different types of cartilage
13. Enumerate the main functions of bone.
14. Discuss the apical cell surface specialization.
15. What are the characteristic features found in human face skin?
16. The type of muscle in the tongue is.....
17. The white fiber has a.....diameter than red fiber
18. The central dark line that bisects the muscle fiber (by E.M) is.....
19. The epithelial lining of urinary bladder is .....
20. What is lymphocyte?
21. What are the light & electron microscopical features of cardiac muscles?
22. What are the features of human hair?
23. What are the layers that separate air from blood in the lung?
24. What is capillary?
25. Mention (in order) layers of skin from uppermost to lower most layer.
26. What is membrane?

**27. Regarding connective tissue:**

? **Define**

? **Classify**

? **Mention the types**

? **What are the functions?**

? **What are the components?**

**28. How lymphatic vessels differ from blood vessels?**

**29. What are osteoblasts & osteoclasts?**

**30. Pseudostratified epithelium:**

? **Define**

? **What are the functions?**

? **Mention the location.**

**31. What is lymphocyte?**

**32. What are the light & electron microscopical features of cardiac muscles?**

**33. Define the epithelium, functions & classification. Give examples.**

**34. What are the cells found in the respiratory tract?**

**35. What are the histological differences between artery & vein?**

**36. What are the functions of bone, & how bone is formed?**

**37. What are granulocytes & a granulocytes?**

**38. Compare between different types of adult human cartilage.**

**39. What are the factors that determine human's skin color?**

**40. : Compare between cardiac & smooth muscles in:**

a. T- Tubules, striation, site, neural control, response to injury

**Embryology Questions:**

**Q1-Tabulate the differences' between mitosis and meiosis by drawing.**

**Q2-Tabulate the differences' between mitosis and meiosis by diagraming the spermatogenesis & oogenesis.**

**Q3-Write the male and female reproductive organs functions.**

Q4-Draw Amphioxus, Amphibian & Bird Blastula Fate map.

Q5-Draw the late gastrulation in Amphioxus & in Amphibian & Bird.

Q6-Draw the 3-4 MM frog whole mount & its cross section through the heart.

Q7- Draw the whole mount of Amphioxus.

Q8- Draw the whole mount of 33 hours chick incubation.

Q9- Draw the development of egg passes through the oviduct.

Q10-Draw the cleavage of three examples: Amphioxus, Frog & Bird.

Q11-What's the difference's between unfertilized egg & fertilized egg with example.

Q12-Fill the blanks with scientific sentences:

1- The ovary is covered overall by-----and-----

2-The Ovary is an overall structure which gives rise to several different main types of follicles:-----

3-In general, the uterus is composed of three layers:-----

4-Active mammary glands: -----

-----while inactive mammary glands: -----

5-Gametogenesis include the both of -----is the production of-----and -----

-----is the production of -----.

6-The tubules of male reproductive system extend continuously into -----

7-Sertoli cells are-----

-----while Leydig cells -----

8-Seminal vesicle-----9-

The erectile tissues of penis are-----

10-Three different types of eggs based on yolk type-----

11- The blastula in Microlecithal eggs-----

12-The stages development embryo are-----

13-Invagination in Microlecithal eggs-----

14-Neurulation steps are-----

15-Mitosis means----- n of chromosomes while Meiosis means ----- n of chromosomes.

Q13-Tick (T, True) or (F, False) to the following statement and then correct the false ones:

1-Theca Interna (Contains Extracellular Matrix) and Theca Externa (Contains Capillaries).

2- Corpus Albicans: a second degenerating structure in the outside layers of the ovary; will degenerate before the egg is ovulated. CT will fill the lumen of the follicle and the follicular epithelium will.

3-The Sertoli Cells have functions for support and they are a part of the developing sperm cells.

4- Spermatic chord runs continuously from the ductile efferent. Lined with pseudostratified ciliated columnar epithelium and surrounded by a basement membrane and smooth muscle.

5-Prostate glands surrounded by thin epithelial tissue secrete pre-ejaculatory fluid.

Q14-Draw and label:

- 1- Graafian follicle.
- 2- C.S. of Seminiferous tubules.
- 3- C.S. of penis.
- 4- Fate map of Amphioxus.
- 5- Late Gastrula of Amphioxus.

**Q15-Explain and drawing**

- 1- Embryonic membranes which support the life and growth of the embryo.
- 2- Gastrulation in Microlecithal sample
- 3-Egg production in bird
- 4- The stage development of embryo.
- 5- The parts of oviduct in birds.

**Q16-Tabulate the differences between Amphioxus blastulation & amphibian blastulation**

**Q17-List the functions of:**

- 1-Germ layers of developing embryo in amphibian.
- 2-Prostate gland.

**Q18- Draw & label of the following:**

- 1-Amphioxus larva whole mount
- 2-Cross section through tail of frog larva

**Q19- Define the following:**

- 1- Gastrulation    2- Sertoli Cells    3- Magnum    4- Amnion    5-Oogenesis    6- Isthmus    7- Gametogenesis

**Q20-Classify gradually the layers of vas deferens in male reproductive system**

**Q21-Tabulate & drawing the differences between Amphioxus gastrulation & Amphibian gastrulation .**

**Q22- Draw & label:**

- 1-The frog Embryo – Late gastrula
- 2- The 3-4 mm frog larva - Whole Mount & its cross sections.
- 3- The egg passes steps in ovi duct of bird.

**Q23-Explain & drawing the blastulation in microlecithal sample.**

**Q24-Tabulate the differences between the following**

**1-Amphioxus blastulation & Amphibian blastulation.**

**2-Germ layers derivatives of Amphioxus & Amphibian**

**Q25-Draw and label:**

**a. Whole mounts of Amphioxus**

**b. Labeling whole mounts of 33-hour chick embryo incubation.**

**Q26- Classify gradually the layers of vas deferens in male reproductive system.**

**Q27—Fill these blanks:**

1-Graafian Follicle -----2-  
Spermatogenic chord -----The-----different  
types of eggs based on yolk type -----4-The brain parts of frog 3-4 mm whole  
mount are 1-----2-----3-----5- In birds sperm production (spermatogenesis) may  
occur primarily at -----when body temperatures are slightly -----6-germinal disc or blastodisc-----  
-----7-The Incubation Period-----  
-----8-The brain parts of 33-hour chick  
embryo are 1-----2-----3-----4-----  
-----5-----The frog egg is a-----10- The chalazae:-----

**Q28-Draw and label**

**a. Labeling whole mounts of 33-hour cross section chick embryo incubation.**

**b. Labeling whole mounts of 72-hour chick embryo incubation.**

**Q29-Fill the blanks with scientific words:**

1-The ovary is an overall structure which gives rise to several different main types of follicles:-----2-  
In general, the uterus is composed of three layers-----,  
3- Gametogenesis include the both of -----is the production of-----and -----  
-----is the production of -----  
4- The tubules of male reproductive system extend continuously into -----  
5- Sertoli cells are-----  
-----while Leydig cells -----  
6- Seminal vesicle-----  
7-Mitosis means----- n of chromosomes while Meiosis means ----- n of chromosomes .

**Q30-Tick (T, True) or (F, False) to the following statement and then correct the false ones:**

**1-Theca Interna (Contains Extracellular Matrix) and Theca Externa (Contains Capillaries).**

**2- Corpus Albicans: a second degenerating structure in the outside layers of the ovary; will degenerate before the egg is ovulated. CT will fill the lumen of the follicle and the follicular epithelium will.**

**3-The Sertoli Cells have functions for support and they are a part of the developing sperm cells.**

**4- Spermatic chord runs continuously from the ductile efferent. Lined with pseudostratified ciliated columnar epithelium and surrounded by a collagenous basement membrane and smooth muscles.**

**5- Prostate glands surrounded by thin epithelial tissue secrete pre-ejaculatory fluid.**

**Q31- 31-Draw and label C.S. Graafian follicle.**

**Q32- Draw and label C.S. of Seminiferous tubules.**

**Q33- Draw and label C.S. of penis.**

**Q34- Draw and label the step formation of egg and sperm**

**Q35- Draw and label whole mounts of 24-hour cross section chick embryo incubation.**

**Q36-Draw and label whole mounts of 96-hour chick embryo incubation.**

**Q37-Draw and label Labelling:**

**The 3-4 MM Frog - Whole Mount with C.S. of following:**

**a- Section through anterior tip of prosencephalon.**

**b- Section through mesencephalon, infundibulum, optic cups, lens, oral evagination, and adhesive gland.**

**c- Section 151 of 336 through spinal cord, notochord, somites, midgut, yolky endoderm, and dorsal fin.**

**d- Section through tail, dorsal and ventral fins.**

**Q38- Explains the structure and functions of spermatic cord with Drawing & labeling of it?**

**Q39- Explains the structure and functions of cervix (cervical gland) with Drawing & labeling of it?**

**Q40- Define the different structural part of egg with Drawing & labeling of it?**

**20. Extra notes:**

**Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks.**

**26. Peer review**

