

SYLLABUS

COURSE: DENF 1501 General Histology
SEMESTER: Fall
CREDIT HOUR: 3.5

REVISED: 2001
REPRINTED: 2009

COURSE DIRECTOR: Keri C. Smith, Ph.D.

GOAL

General Histology introduces the dental student to a large vocabulary of basic science terms. This course contains the basis of cell biology, tissue microstructure and function, and the microanatomy of the organ systems.

This course is offered early in the dental curriculum to provide you with knowledge that helps bridge the gap between biological chemistry and gross anatomy, as well as serving to introduce structures and concepts that are studied in depth in physiology, pharmacology and pathology. Wherever possible, the clinical significance and application to subsequent courses will be stressed.

Upon completion of this course you will be able to describe how the cells and extracellular components of the human body are composed and arranged to form the various tissues and organs. You will recognize the microscopic structure of many of the cell and tissue types by viewing electron and light microscopy images. You will also learn to identify tissues and cells using the light microscope. You will be able to relate your knowledge of gene function and protein synthesis to the functions and interactions of cellular and extracellular structures. This general knowledge will assist in enabling you to understand the nature of the head and neck and oral structures that you must know in detail to be an excellent dental practitioner.

OBJECTIVES

I. INTRODUCTION AND METHODS

1. List the methods used to visualize the arrangement and composition of cells and tissues and state some of the general principles of tissue fixation, staining, localization and examination, which permit accurate interpretation.
2. Describe the meaning of commonly used terms in histologic methods, such as histochemistry, cytochemistry, immunohistochemistry, in situ hybridization, radioautography, etc.

II. THE CELL

1. Describe the structure and function of cytoplasm, cell membrane, cytoskeleton and of the organelles within the cell.
2. Describe the structure and function of the cell nucleus and explain chromosome structure and the roles of DNA and RNA in protein synthesis.
3. List the phases of cell division and explain the stages of the cell cycle for both mitosis and meiosis.

III. BLOOD

1. Name the blood cells found in peripheral blood and describe the important histological features and functions of each.
2. Give locations in the human body where hematopoiesis takes place and describe the **general features** of the formation and maturation of the blood cells and platelets.

IV. EPITHELIUM AND GLANDS

1. State the general characteristics and functions of a generic epithelial tissue.
2. List the common types of epithelium classifications and explain how the structure is related to their functions.
3. Understand the general classification of glands according to structure and function and give a general statement of the manner in which the glandular epithelial cells carry out their functions.

V. GENERAL CONNECTIVE TISSUE

1. Describe the general arrangement and functions of connective tissue using the terms: ground substance, extracellular matrix, fibers and cells.
2. List the types of connective tissue and give examples of a specific location of each type in the human body.

VI. INTEGUMENT

1. Describe the general structure of the integument including epidermis, dermis and hypodermis.
2. Describe the histologic characteristics and functions of cells in the epidermis and dermis.
3. Be able to describe the extracellular matrix of the dermis including its functions.
4. Give a general description of the microscopic structure of hair and hair follicles, nails, sebaceous glands and sweat glands.

VII. CARTILAGE

1. Describe the microscopic structure of cartilage and distinguish the three main types as to extracellular matrix differences, structural properties and locations in the human body.
2. List the cells of cartilage, give the composition of cartilage matrix, list its unique properties and describe how cartilage is capable of growing.

VIII. BONE AND BONE FORMATION

1. Describe the histologic structure and function of bone including cells and the bone matrix.
2. Describe bone in terms of the different types using the terms primary, secondary, mature, immature, spongy, compact and woven.
3. Distinguish between intramembranous and endochondral ossification and describe the general features of bone growth and remodeling.
4. List the four types of joints and give the main features of synovial joints.

IX. MUSCLE TISSUE

1. Describe the microscopic arrangement of skeletal muscle and give a description of how the muscle fibers are structured for contraction.
2. Describe the main features of cardiac muscle and how it is unique.
3. Describe the arrangement of smooth muscle fibers and give some of the structural and functional characteristics.

X. NERVE TISSUE

1. Describe the arrangement of nerve tissue into central nervous system and peripheral nervous system.
2. Describe the neuron using the terms: perikaryon, dendrites and axons.
3. List the types of neuroglia and give their functions.
4. Describe myelinated and unmyelinated nerve fibers and explain the general structure and events of nerve synapses.

5. Describe the microscopic arrangement of ganglia and of white matter and gray matter.
6. Describe the microscopic events in nerve degeneration and regeneration.

XI. DIGESTIVE SYSTEM

1. Give a description of the general plan of the microscopic structure of the digestive tract.
2. Describe the distinctive features of the esophagus and stomach.
3. Describe the microscopic structure of the small intestine and the unique features of the duodenum, jejunum and ileum.
4. Give the microscopic structural features of the large intestine and appendix.
5. Describe the **exocrine** pancreas by giving the arrangement of the secretory cells and by listing enzymes produced.
6. Describe the histology of the liver and relate this to the portal circulation.
7. Describe the structure of the hepatocyte and list some of its main functions.

XII. THE LYMPHATIC SYSTEM

1. Describe the basic types of cells involved in the makeup of lymphoid tissue and briefly describe their roles in the immune response.
2. State the functions and microscopic structure of lymphatic tissues and organs including diffuse lymphatic tissue, lymphatic nodules, thymus, lymph nodes, spleen and tonsils.
3. Recognize the distinctive microscopic features of the thymus, spleen, lymph nodes and tonsils.

XIII. THE ENDOCRINE SYSTEM

1. Describe the origin of the pituitary gland and its relation to the hypothalamus.
2. Describe the way the neuroendocrine system operates to control the various organ systems.
3. Name the hormones produced by the cells of the adenohypophysis and describe their functions.
4. Name the regions of the adrenal cortex and relate them to the hormones produced.
5. Describe the adrenal medulla, the hormones produced here and the action of the hormones.
6. Name the cells and hormones of the islets of Langerhans and describe the functions of these hormones.
7. Describe the thyroid gland giving it general organization, cells, hormones produced and function of the hormones.

8. Describe the location, general structure and function of the parathyroid glands and the pineal gland.

XIV. REPRODUCTIVE SYSTEMS

1. Name the parts of the male reproductive system and describe the microscopic structure of the testis.
2. Describe how sperm are produced and the general hormonal control of this process.
3. Name and describe the components of the female reproductive system.
4. Describe the microstructure of the ovary and describe how an ovum is formed, matures and released.

XV. CARDIOVASCULAR SYSTEM

1. Give the microscopic structural characteristics of arteries, veins and capillaries.
2. Describe the general microscopic features of the heart.

XVI. RESPIRATORY SYSTEM

1. Name the structures that conduct the air to the alveoli of the lungs and describe the surface epithelium with its cilia and goblet cells.
2. Describe the alveoli and the lung capillaries and how molecules are exchanged between the blood and air.

XVII. URINARY SYSTEM

1. Give the overall arrangement of the kidney structures and relate this to the blood circulation and urinary collecting system.
2. Describe the nephron using the terms: renal corpuscle, juxtaglomerular cells, glomerulus, proximal convoluted tubule, loop of Henle and distal convoluted tubule.

XVIII. SPECIAL SENSES (Eye and Ear)

1. Describe the eye by naming its parts and distinguishing the cornea, lens, ciliary body, iris, sclera, retina and optic nerve.
2. Name the cell types of the retina and give an overview of how light is translated into images to the brain.
3. Describe the ear by naming its parts and defining the components that make up the external ear, the middle ear, and internal ear.
4. Identify the parts of the cochlea and be able to briefly describe how it functions as a sound receptor.

RESOURCES

I. Media Resources

A. Printed media

1. Required textbook
Luiz Carlos Juncquiera and Jose Carneiro.
Basic Histology Text and Atlas, 11th ed.
McGraw - Hill, 2005
2. Recommended atlases (choose either one)
Gartner and Hiatt,
Color Atlas of Histology, 4th ed.
Lippincott, William & Wilkins, 2005

Ross, Pawlina
Histology: A Text and Atlas, 5th ed.
Lippincott, William & Wilkins, 2006

B. Non-printed media

1. Monograph "General Histology Lectures and Laboratory assignments" on BlackBoard.
2. Images on BlackBoard as PowerPoint presentations.
3. Links, self-quizzes, and tissue identification exercises can also be found on Blackboard
4. Microscope slides - Boxed slide collection (student rental) and white slide boxes (instructor provided)
5. Light microscope (student rental)

II. Human Resources

Keri Smith, Ph.D.

Course Director

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STUDY PLAN AND REQUIREMENTS

This course is presented as a series of lectures and study laboratory periods devoted to the study of histology.

In order to complete this general histology course successfully it is essential that you read the assignments in your required textbook, attend all scheduled lectures and laboratories and take full advantage of faculty availability during the scheduled laboratories.

The study laboratory sessions are scheduled and each period will be conducted by the instructor who lectured on the topic of the day. Each student is expected to attend and participate in every scheduled laboratory session.

There may be unannounced short quizzes any time during the scheduled laboratory time.

Study Habits and Help During the Course

Different students require different levels and amounts of help. It is often difficult for students to determine the amount of effort to master specific material.

In order to study in the most effective manner, the instructors suggest the following

1. Read the text assignment before the lecture. This assignment provides an overview of the material so that when the lecture is presented the material can be seen more clearly in the correct perspective. During this initial reading do not try to memorize details but do try to get an overview.
2. Attend the lecture, make appropriate notes and ask questions either during or after the lecture.
3. Using the lecture outline with descriptions of PowerPoint and microscope slides, examine the assigned material. The most effective time usage is to study the appropriate microscope slides and find the structures as listed in your laboratory descriptions. PowerPoint slide presentations are also provided for you to further understand what you are supposed to be looking at.
4. Use lecture notes and text to make sure that you understand the material.
5. The MOST IMPORTANT advice is to ask instructors for help whenever you need it. If an instructor is unavailable, then try to see them in their office, by telephone or email. Do not let any questions go unanswered.

Review Sessions

All review sessions, unless otherwise noted, are optional but highly recommended.

**DENF 1501 GENERAL HISTOLOGY
2009 Fall Semester Schedule**

Tuesday and Thursday, 8:00-10:50 am, with exceptions
Room B81, unless otherwise indicated.

DATE	#	SESSION TOPICS	PRESENTER
Aug 18	I	Introduction & Methods	D. Bick
Aug 20	II	The Cell - Part I	D. Bick
Aug 25		The Cell - Part II	D. Bick
Aug 27 10-10:50 am	III	Blood – Part I (no lab)	Smith
Sep 1		Blood - Part II	Smith
Sep 3	IV	Epithelium & Glands	Smith
Sep 8 10-10:50 am	V	General Connective Tissues (no lab)	Rittman
Sep 10	VI	Integument	Rittman
Sep 15	VII, VIII	Cartilage and Bone	Smith
Sep 17	VIII	Bone and Bone Formation	Smith
Sep 22		Review session	
Sep 24		EXAMINATION I Room 207	Faculty
Sep 29	IX	Muscle	R. Bick
Oct 1 10-10:50 am	X	Nerve Tissue– Part I (no lab) Room 340	Rittman
Oct 6		Nerve Tissue – Part II	Rittman
Oct 8 9-9:50am	XI	Digestive System – Part I (no lab)	Rittman
Oct 13		Digestive System – Part II	Rittman
Oct 15		Review and lab	Faculty
Oct 20 10-10:50 am	XII	Lymphatic System - Part I (no lab)	Smith
Oct 22		Lymphatic System - Part II	Smith
Oct 27	XIII	Cardiovascular System	R. Bick
Oct 29	XIV	Respiratory system	Rittman
Nov 3	XV	Urinary System	Rittman
Nov 5		Review	Faculty
Nov 10		EXAMINATION 2 Room 207	Faculty
Nov 12	XVI	Special Senses-Eye	D. Bick
Nov 17	XVIII	Special Senses - Ear	D. Bick
Nov 19	XIX	Endocrine System – Part I	R. Bick
Nov 24	XIX	Endocrine System – Part II	R. Bick
Nov 26-27		<i>Thanksgiving Holiday</i>	
Dec 1	XX	Male Reproductive System	Smith

DATE		SESSION TOPIC	PRESENTER
Dec 3	XXI	Female Reproductive System <i>Course evaluation</i>	Smith
Dec 7 9-11:50 am		EXAMINATION 3: FINAL EXAMINATION Room 207	Faculty

EVALUATION METHODS

The evaluation of student performance in general histology will be based on the grades received in the three major examinations appearing in the schedule, plus any unscheduled short quizzes and laboratory participation.

The major examinations will consist of written and practical portions. Each major examination will be 30% of the grade for the course and the quizzes, laboratory attendance and participation will account for the remaining 10% of the grade.

Grades are NOT curved in this course.

Laboratory participation

The laboratory sessions are, in the opinion of the instructors a critical part of this course, as such receives grade points. The grade points are based on attendance and participation during the individual sessions. Appropriate participation is based on the following criteria:

1. Remaining in the laboratory for the appropriate length of time as determined by the instructors.
2. Working only on Histology topics such as in Histology texts and the Histology Lecture outlines.
3. Clarifying concepts and information that is unclear to you by asking instructors for help
4. Participation in group discussions.

At the end of each session, the instructors in the laboratory discuss participation by individual students and the level of participation and attendance is recorded.