Animal Histology (BIO 449.001)  
Fall Semester 2019  
Miller Sci Room 225  
TR 200 – 315pm  

Instructor: Dr. Kevin Langford  
Department: Biology  
Office: Miller Science #224  
Phone: 468-2315  
Email: klangford@sfasu.edu  

Office hours:  
M-F –8-10am  

Course Description:  
Four semester hours, two hours lecture, six hours lab per week. Microscopic structure of vertebrate tissues and cells, with consideration of their origin and their function in the adult body.  

Pre-requisite(s): Bio 241 with a minimum of a C  
Co-requisite(s): Bio 449L  
Bio 341 with a minimum of a C  


Program Learning Outcomes:  
Each of the student learning outcomes listed below address the Biology Department Program Learning Outcome #1: Demonstrate a good knowledge base in biological concepts and be able to integrate knowledge with critical thinking skills to become problem solvers. Knowledge base will include: levels of complexity (molecular/cellular through population/communities/ecosystems); biological principles and processes.  

Course Objectives:  
- Provide students with an understanding of the four basic tissue types: epithelial tissue, connective tissue, muscle tissue and nervous tissue.  
- Provide students with an understanding of the structure and function of each organ system in the human body with the focus on cellular and tissue organization.  
- Compare and contrast pathological conditions with normal tissues.  
- Animal histology lab no only reinforces material learned in lecture, but allows the students the opportunity to compare and contrast tissue organization. Lab also builds the deductive reasoning skills (differential diagnosis) of the students in the identification of any tissue from the human body.
Student Learning Outcomes (Course Competencies):
Student understanding will be evaluated with comprehensive exams (i.e., short answer, and essay questions) surveying in detail the material to be mastered. Students who successfully complete animal histology will be able to:

Epithelia

- Describe the main morphological features typical of epithelia.
- Explain how epithelial tissues allow effective compartmentalization.

Connective tissue

- List the main functions of connective tissue.
- List the normal cellular constituents of connective tissue.
- Describe and name the main types of extracellular fibrous networks which are normally observed in connective tissue.
- Describe how a mast cell can be recognized under the microscope.
- List the main structural characteristics of adipose tissue.
- List the main types of cartilage and describe their functional properties, giving examples of their location.
- Briefly explain the function of Haversian and Volkmann canals in compact bone?
- List types of ossification process and indicate examples of sites where each occurs.

Skin

- Describe the morphological differences between thin and thick skin and list sites in the human body where each is found.
- List the principal layers of the epidermis.
- Outline the principal functions of the epidermal dendritic cells.
- List the types of tissues and glands which are found in the dermis of the skin.
- Draw a cross-section diagram of a hair at the level of the sebaceous gland.

Peripheral nervous system

- Describe briefly the structure and function of myelin.
- List the main morphological features of myelinated and non-myelinated nerve fibers.
- Draw a simple diagram of a myelinated nerve fiber, showing clearly nodes of Ranvier and Schmidt-Lanterman clefts.
- Draw a cross section of a large peripheral nerve indicating clearly what is meant by epineurium, endoneurium and perineurium.
Circulatory system

- List the structural layers which form the wall of medium size muscular arteries.
- List the main types of capillary and indicate their sites.
- Explain the similarities and differences between endothelium, epithelium and mesothelium.
- List the main constituent parts of the heart wall.
- List the main functions of the cardiovascular system.

Respiratory system

- List the main functions of the respiratory system.
- Describe the functions of the conducting passages.
- Describe the special features of cells of the olfactory mucosa.
- Draw a diagram indicating the organisation of cells and tissues in the trachea.
- Explain the structural difference between a bronchus and a bronchiole.
- List the types of cells found in bronchiolar and alveolar epithelia.

Urinary system

- List the main regions and structures which can be seen without the aid of a microscope on a cross-sectioned kidney.
- List the constituent parts of a nephron.
- List the components of the glomerular filtration system.
- Draw a simple diagram to indicate the position of the mesangial cells which are associated with the glomerulus.
- Draw a sketch of the wall of the ureter.
- Describe the distinguishing features of the urinary or "transitional" epithelium.

Gastrointestinal tract

- List the structural layers which form the wall of the gastrointestinal tract.
- Describe the epithelium, and the type and arrangement of muscle, in the esophagus.
- List the main characteristics and cell types of the gastric glands.
- Describe the part of the intestines where the Brunner's gland is found, and outline the function of its secretory product.
- Describe the ways in which the surface area for absorption in maximized in the small intestine.
- Describe which type of tissue is prominent in the appendix.
- Relate the histological organization to function in the colon.
Digestive glands

- List the main types of salivary gland and describe their general organization and secretory products.
- Draw a simple diagram of a liver lobule indicating the direction of flow of blood and bile with respect to the central vein and portal areas.
- List the main products of the hepatocyte, both endocrine and exocrine.
- Draw a diagram to indicate the arrangement of cells in a liver sinusoid.
- Explain the function of Kupffer cells.
- Explain how the functions of the gall bladder relate to its structure.
- Describe the features visible in a histological section of the pancreas, and explain the acinar organization of its exocrine part.

Male reproductive system

- Describe the main structural features of the testis and seminiferous tubule, and explain the function of the Sertoli cell.
- List the main stages of the development of the sperm.
- Describe the site and function of the Leydig cells.
- Sketch the structures of the epididymis and ductus deferens.
- List the secretory products of the prostate and seminal vesicles.

Female reproductive system

- List the stages of follicle development, indicating when the different hormones are produced.
- Outline the main stages of meiosis and explain when they occur during formation of an ovum.
- Describe the appearance of the cells lining the uterine tube.
- Describe the changes in the histological appearance of the uterus which occur during the menstrual cycle.
- Describe the epithelia lining the uterine cervix and vagina.
- Distinguish the structures of lactating and non-lactating mammary gland.

Endocrine glands

- Explain the differences in structure between a typical exocrine gland and a typical endocrine gland.
- Differentiate between the two main parts of the pituitary and explain how hormone secretion is controlled in each part.
- Describe the histology and functions of the two parts of the suprarenal gland.
- Explain the structure of the thyroid gland, and how its appearance varies with glandular activity.
- What are the ultrastructural differences between endocrine cells secreting: (a) peptide hormones (b) amine-derived hormones (c) steroid hormones
Cells involved in immune responses

- Describe the differences between B and T lymphocytes.
- Outline the path of recirculation of lymphocytes.
- Describe the morphological consequences of B and T lymphocyte stimulation.
- Explain the origin, morphology and function of plasma cells.
- List the cells belonging to the mononuclear phagocyte system.
- List the important antigen presenting cells and indicate where they are found.

Lymphoid organs

- Name and list the differences between primary and secondary lymphoid tissues.
- Describe the origin and fate of lymphocytes in the thymus.
- Describe and explain the consequences of a lack of a thymus.
- Draw a diagram of a lymph node, indicating the main structural features.
- Describe the changes which occur in a lymph node after stimulation with antigen.
- Explain what is meant by the "white pulp" of the spleen and describe the most important cells found there.

Hemopoiesis

- Explain what is meant by a steady-state cell renewal system.
- Explain the essential difference between hemopoietic stem cells and progenitor cells.
- List the normal cellular constituents of the bone marrow.
- Describe the regulation of erythropoiesis.
- List the functions and life-span of various types of blood cell.
Histology: Bio 449 - Fall 2019
TR 200-315 pm
Tentative Lecture Schedule
Note: Lecture topics and dates may be changed during the course of the semester at the instructor's discretion. The class will be notified of any changes via D2L email.

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic(s)</th>
<th>Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 27</td>
<td>Introduction /Epithelium</td>
<td>1</td>
</tr>
<tr>
<td>Aug 29</td>
<td>Epithelial Tissue</td>
<td>5</td>
</tr>
<tr>
<td>Sep 3</td>
<td>Glandular Epithelium</td>
<td></td>
</tr>
<tr>
<td>Sep 5</td>
<td>Connective Tissue</td>
<td>6</td>
</tr>
<tr>
<td>Sep 10</td>
<td>Cartilage</td>
<td>7</td>
</tr>
<tr>
<td>Sep 12</td>
<td>Bone</td>
<td></td>
</tr>
<tr>
<td>Sep 18*</td>
<td>Unit I Lecture Exam (chap 1, 5-7)</td>
<td></td>
</tr>
<tr>
<td>Sep 17</td>
<td>Muscle Tissue</td>
<td>8</td>
</tr>
<tr>
<td>Sep 19</td>
<td>Nervous Tissue</td>
<td>9</td>
</tr>
<tr>
<td>Sep 24</td>
<td>Circulatory system</td>
<td>11</td>
</tr>
<tr>
<td>Sep 26</td>
<td>Blood</td>
<td>10</td>
</tr>
<tr>
<td>Oct 1</td>
<td>Lymphoid Organs</td>
<td>12</td>
</tr>
<tr>
<td>Oct 3</td>
<td>Lymphoid Organs</td>
<td></td>
</tr>
<tr>
<td>Oct 8</td>
<td>Cutaneous Tissue</td>
<td>14</td>
</tr>
<tr>
<td>Oct 9*</td>
<td>Unit II Lecture Exam (chap 8-12)</td>
<td></td>
</tr>
<tr>
<td>Oct 10</td>
<td>Digestive system: GI Tract</td>
<td>16</td>
</tr>
<tr>
<td>Oct 15</td>
<td>Digestive system: GI Tract</td>
<td>17</td>
</tr>
<tr>
<td>Oct 17</td>
<td>Digestive system: Exocrine Glands</td>
<td>18</td>
</tr>
<tr>
<td>Oct 22</td>
<td>Digestive system: Exocrine Glands</td>
<td></td>
</tr>
<tr>
<td>Oct 24</td>
<td>Respiratory system</td>
<td>15</td>
</tr>
<tr>
<td>Oct 29</td>
<td>Respiratory system</td>
<td></td>
</tr>
<tr>
<td>Oct 31</td>
<td>Urinary system</td>
<td>19</td>
</tr>
<tr>
<td>Nov 4*</td>
<td>Unit III Lecture Exam (chap 14-18)</td>
<td></td>
</tr>
<tr>
<td>Nov 5</td>
<td>Urinary system</td>
<td></td>
</tr>
<tr>
<td>Nov 7</td>
<td>Urinary system</td>
<td></td>
</tr>
<tr>
<td>Nov 12</td>
<td>Endocrine system</td>
<td>13</td>
</tr>
</tbody>
</table>
Attendance Policy: Attendance is expected and encouraged for all lectures. At the beginning of each lecture, students will be required to sign his/her name on a circulated attendance sheet (placed at the front of the classroom). *Failure to sign your name will be considered an absence even if you were in class.*

For excused absences (as determined at my discretion), I will adhere to the University policy on attendance and absences.

Make-up Exams: Students with *excused absences ONLY* will be allowed to make-up missed exams.

- The determination of an absence as excused or unexcused will be at my discretion.
- Make-up exams will be entirely an essay exam format.
- A make-up exam must be taken within three weeks of the missed exam.
- All missed exams *MUST BE COMPLETED* prior to dead week.
- The Final Exam must be taken on the day and time assigned. *NO EXCEPTIONS!*

Lecture Grading: 500 total points are available from the lecture component of the course. There will be three, 100 point lecture exams and a 100 point final exam (not cumulative). Also 100 points may be earned through quizzes over the course of the semester.

Lecture Exams* = 300  
Quizzes = 100  
Final Exam* = 100

500 total possible points from lecture

* Graduate students seeking credit for BIO 549 will be required to answer all essay questions provided on the exams and will be afforded additional time over that allotted for undergraduate students who will choose from the essay prompts which ones they will answer.
**Course Grading:** The lab component of the course contributes an additional 500 points toward your final grade (see lab syllabus).

Final grades for the course will be assigned as follows as a percentage of the final 1000 points possible:

A=100-89.5% (≥ 895)
B= 89-79.5% (894-795)
C= 79-69.5% (794-695)
D= 69-59.5% (694-595)
F= <59.5% (≤ 594)

**Academic Integrity (A-9.1):**

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

**Definition of Academic Dishonesty**

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one’s own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained form an internet source or another source; and (3) incorporating the worlds or ideas of an author into one’s paper without giving the author due credit.

Please read the complete policy at [www.sfasu.edu/policies/academic_integrity.asp](http://www.sfasu.edu/policies/academic_integrity.asp)
Withheld Grades Semester Grades Policy (A-54):

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they received a WH, or the grade automatically becomes an F. If students register for the same course in future terms, the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

Students with Disabilities:

To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468/3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to www.sfasu.edu/disabilityservices/

Acceptable Student Behavior (D-34.1):

Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.