**Vertebrate Anatomy**

**BIOL 381 (&381L), 3/1 cr. hrs.**

Black Hills State University

**Spring, 2009**

**Course Meeting Time and Location:**

lecture - 12:00-12:50 MWF, BJA 303

lab - 3:00-4:50 Tuesday, BJS 147

# Instructor’s Contact Information:

## Dr. Charles Lamb

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Office hours – MW 1-2, TTh 8-9

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# Course Description :

This course is a study of the anatomy of the vertebrates with an emphasis on the mammals.

**Course Prerequisites:**

This course requires prior completion of BIOL 151 & 151L, and concurrent enrollment in BIOL 381 & 381L. As far as student preparation, I will announce the required reading for each meeting in advance, and I expect each student to read the material before coming to class. Falling behind in this course is easy to do and difficult to remedy (we will be covering approximately 750 pages of text in lecture alone!), so it is the responsibility of each student to be prepared.

# Description of Instructional Methods:

### The material will be taught using a combination of lecture presentations, laboratory dissections of the cat, prosected material from humans and other organisms, videodisc material on the human body, and computerized instruction formats.

**Course Requirements:**

Textbooks:

 Lecture - *Human Anatomy*  (required)

 Martini, Timmons, & Tallitsch

 Lab - *A Study of the Cat: with Reference to Human Beings* (required)

 Walker and Homberger

Attendance Policy -

Regular attendance is the responsibility of each student. You will not be penalized for missing lectures (other than having to depend on your fellow students for the material covered that day), but I plan on covering about 30 pages of text per day and it is your responsibility to keep up with the class. In laboratory, I expect you to put in as much time and effort as it takes to learn the structures of the body. How you do this is your business, but I strongly recommend taking advantage of the time that I am with you in the laboratory. Students may not miss an examination, unless they contact me prior to the scheduled examination date to arrange for a make-up exam. Any unexcused absences will result in the student receiving zero points for that examination.

Cheating and plagiarism policy -

Each student should be familiar with the guidelines for Personal Identification and Representation as stated in the Student Handbook. The following passage is particularly relevant:

 *"A student who, in connection with his or her studies, disrupts a class, plagiarizes, cheats, or otherwise violates reasonable standards of academic behavior may, at the discretion of the faculty member involved, have his or her enrollment cancelled and/or be given a reduced or failing grade."*

You're investing your money and your time in order to get a quality education, so I expect all of you to act as responsible adults.

Make-up policy -

(see above)

**Course Learning Goals or Objectives:**

We will be learning how form is related to function in the vertebrate body. You should come out of this course with a detailed knowledge of how structure affects function in different organ systems in the body. This course is designed to prepare students for advanced study in professional or graduate school programs.

**Evaluation Procedures:**

Students will receive separate grades for the lecture and laboratory portions of this course. The grades will be determined as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| **Percentage** | **Grade** | **Lecture** | **Lab** |
| 90-100 % | A | 324-360 pts | 225-250 pts |
| 80-89 | B | 288-323 | 200-224 |
| 70-79 | C | 252-287 | 175-199 |
| 60-69 | D | 216-251 | 150-174 |
| <60 | F | 0-215 | 0-149 |

Lecture -

Each of the three exams will cover only material presented during that section of the course. They will be worth 100 points each. In addition to the 3 exams, there will be 3 short quizes worth 20 points each. Thus, there are 360 points available in the lecture portion of the course.

Labs -

Each student's performance in lab will be evaluated by two practical exams, each involving only the material covered during that portion of the course. These tests are worth 100 points each. An additional 50 points is available in the form of a lab notebook that the student produces during the course of the semester. This notebook will be a collection of notes, drawings, comments, etc. that the student will contribute to every day they are in the lab. It will be graded on originality, completeness, and effort, so copied or traced material is discouraged. There is no set format that each student must follow, but this should be approached as a study aid to help you learn the multitude of structures that you will be responsible for in lab.

**ADA Statement (must be used verbatim):**

*“Reasonable accommodations, as arranged through the Disabilities Services Coordinator, will be provided students with documented disabilities. Contact the BHSU Disabilities Services Coordinator at 642-6099 (Jacket Legacy Room in the Student Union) for more information.”*

**Academic Freedom and Responsibility (must be used verbatim):**

*“Under Board of Regents and University policy student academic performance may be evaluated solely on an academic basis, not on opinions or conduct in matters unrelated to academic standards.  Students should be free to take reasoned exception to the data or views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.  Students who believe that an academic evaluation reflects prejudiced or capricious consideration of student opinions or conduct unrelated to academic standards should contact the chair of the department in which the course is being taught to initiate a review of the evaluation.”*

**Tentative Course Outline/Schedule:**

Lecture:

 Section 1 - Chapters 1-8 in Martini, Timmons, and Tallitsch;

 Quiz on Wed., **Feb. 06**; Exam on Fri., **Feb. 23**

 Section 2 - Chapters 9-18 in Martini, Timmons, and Tallitsch;

 Quiz on Wed., **Mar. 20**; Exam on Fri., **Apr. 03**

 Section 3 - Chapters 19-28 in Martini, Timmons, and Tallitsch;

 Quiz on Wed., **Apr. 24**; Exam at **9:45 AM** on Tues., **May 05** (Final)

Lab:

 Section 1 - External anatomy, Skeleton, Muscles

 Exam on Tues., **Mar. 03**

 Section 2 - Nervous, Digestive, Respiratory, Circulatory, and Urogenital systems

 Exam on Tues., **April 28**

(See following pages for a detailed schedule.)

**Vertebrate Anatomy (BIOL 381) Lecture Schedule (tentative):**

**(Spring, 2009)**

|  |  |
| --- | --- |
| **Date** | **Topic** |
| **Jan 16** | Introduction (Ch.1) |
| **19** | MLK Day |
| **21** | Tissues |
| **23** |  "  |
| **26** | Integument |
| **28** |  "  |
| **30** | no class (Science Fair) |
| **Feb 02** | Skeletal Structure (Ch. 5) |
| **04** |  " |
| **06** | Axial Skeleton (Ch. 6) (**Quiz 1**) |
| **09** |  " |
| **11** | Appendicular Skeleton (Ch. 7) |
| **13** |  " |
| **16** | Presidents' Day |
| **18** | Articulations (Ch. 8) |
| **20** |  " |
| **23** | **Exam 1** |
| **25** | Muscle Tissue (Ch. 9) |
| **27** |  " |
| **Mar 02** | Muscles (Ch. 10-11) |
| **04** |  " |
| **06** | Nerves (Ch. 13) |
| **09** | Spring Break |
| **11** |  " |
| **13** |  " |
| **16** | Spinal Cord & Nerves (Ch. 14) |
| **18** |  " |
| **20** | Brain (Ch. 15/16) (**Quiz 2**) |
| **23** |  " |
| **25** | Autonomic Nerv. Syst. (Ch. 17) |
| **27** | Senses (Ch. 18) |

|  |  |
| --- | --- |
| **Mar 30** | Senses (cont.) |
| **Apr 01** |  " |
| **03** | Exam 2 |
| **06** | Endocrine System (Ch. 19) |
| **08** | Heart (Ch. 21) |
| **10** | Good Friday |
| **13** | Easter Monday |
| **15** | Vessels (Ch. 22) |
| **17** | Respiratory System (Ch. 24) |
| **20** | Digestive System (Ch. 25) |
| **22** |  "  |
| **24** | Urogenital Systems (Ch. 26/27) (**Quiz 3**) |
| **27** |  " |
| **29** | Development (Ch. 28) |
| **May 01** |  " |
| **05** | **Exam 3** (9:45 on Tues., 05 May) |

**Laboratory Schedule:**

Week 1 - 20 Jan Skeletal System I: axial skeleton -- pp. 10-37 (140 terms)

Week 2 - 27 Jan Skeletal System II: appendicular skeleton -- pp. 38-50 (91 terms)

Week 3 - 03 Feb Muscles I: extern. surf., cutan. trunk, caud. trunk, pect. muscles

 pp. 4-7, 60-72 (23 terms)

Week 4 - 10 Feb Muscles II: pectoral (cont.) -- pp. 72-84 (37 terms)

Week 5 - 17 Feb Muscles III: pelvic muscles -- pp. 84-97 (43 terms)

Week 6 - 24 Feb Muscles IV: pelvic (cont.) -- pp. 97-109 (33 terms)

Week 7 - 03 Mar **Midterm Exam** -- Ch. 1-4 (367 terms)

*Week 8 - 10 Mar* *Spring Break*

Week 9 - 17 Mar Central Nervous System: (demo - coronal sections of sheep brain)

 pp. 127-151 (142 terms)

Week 10 - 24 Mar Peripheral Nervous System & Sensory Organs: (demo - eye & ear)

 pp. 151-157, 112-123 (112 terms)

Week 11 - 31 Mar Digestive & Respiratory Systems: (demo - pig lungs & heart)

 pp. 158-186 (156 terms)

Week 12 - 07 Apr Circulatory System I: cranial to heart (demo - sheep & ox hearts)

 pp. 187-209 (93 terms)

Week 13 - 14 Apr Circulatory System II: caudal to heart -- pp. 209-226 (121 terms)

Week 14 - 21 Apr Urogenital Systems: (demo - pig kidney & cow repro. tracts)

 pp. 238-257 (100 terms)

Week 15 – 28 Apr **Final Exam** -- Ch. 5-9; Lab notebooks due (724 terms)

**Safety Guidelines for anatomy labs:**

* Follow all instructions given by your teacher.
* Do not bring food or drinks into the laboratory.
* Minimize contact with preservative chemicals:

- rinse the specimens completely before dissection;

- wear gloves (provided by us) and protective clothing during dissection;

- wear safety goggles (provided by us) to prevent the splashing of any chemicals into the eyes - do not wear contact lenses into the lab under any circumstances;

- know where the eye-wash fountain is and how to use it if needed;

- never ingest specimen parts, or bring hands near mouth or eyes;

- inform your teacher of any illness or injury resulting from exposure to specimens, chemicals, or tools used in the laboratory.

* Handle dissection equipment (provided by us) with extreme care.
* Treat all specimens with appropriate respect and consideration, any inappropriate behavior will result in access to the lab being limited to scheduled class time only.
* Use only your specimen for dissection.
* Never remove specimens or specimen parts from the classroom - until the dissection is completed all parts of the dissection must remain within the dissecting pan.
* Properly dispose of dissected materials – do not wash tissues into the sink or leave them on the counter or the floor.
* Store specimens only as directed by your teacher.
* Clean up the work area and return all equipment (washed and dried) to the proper place when the dissection is completed.
* Wash hands after each dissection.

**Anatomical Structures for BIOL 381L**

**(bold terms from *Walker & Homberger*)**

# Cat Skeletal System

**Axial Skeleton**

**Vertebrae:**

cervical –

transverse foramen, atlas, axis, alar foramen, dens

thoracic –

vertebral arch, spinous process, vertebral canal, vertebral body (centrum), acoelous,

cranial articular processes, caudal articular processes, diapophyses, articular facet, pedicle,

intervertebral foramina, accessory process

lumbar –

pleurapophysis, mamillary process

sacral –

sacrum, dorsal/ventral foramina

caudal –

hemal arches, hemal processes

**Ribs –**

head, tuberculum, neck, body, costal cartilage, vertebrosternal ribs, vertebrocostal ribs,

vertebral ribs, true ribs, false ribs

**Sternum –**

sternebrae, manubrium, xiphisternum, body, xiphoid process

**Head Skeleton**

**General:**

facial region, cranial region, nares, orbits, foramen magnum, occipital condyle, tympanic bullae, external acoustic meatus, mastoid process, paracondylar process, zygomatic arch,

mandibular fossa, temporal fenestra, postorbital processes, nuchal crest, sagittal crest,

temporal line, hard palate, choanae, pterygoid process, hamulus, pterygoid fossa, incisive, maxilla, lacrimal, zygomatic, temporal, squamous portion, petrosal portion , tympanic, endotympanic, malleus, incus, stapes, nasals, frontals, parietals, occipital, interparietal, ethmoid, basisphenoid, presphenoid, vomer, palatine, sutural ligament, periosteum, lambdoidal suture, sagittal suture, synchondroses

**Interior:**

cranial cavity, caudal cranial fossa, rostral cranial fossa, tentorium, internal acoustic meatus,

sella turcica, sphenoidas air sinus, frontal air sinus, cribriform plate, ethmoid, perpendicular plate, conchae, dorsal concha, ventral concha, middle concha, ventral nasal meatus

**Foramina:**

cribriform foramina, optic canal, orbital fissure, foramen rotundum, foramen ovale, internal acoustic meatus, stylomastoid foramen, jugular foramen, hypoglossal canal, ethmoid foramen, infraorbital canal, alveolar foramina, sphenopalatine foramen, palatine fissure, palatine canal, pterygoid canal, auditory tube lacrimal canal, carotid canal, condyloid canal, fenestra vestibuli, fenestra cochleae

**Lower Jaw:**

mandible, dentary bones, intermandibular joint, body, masseteric fossa, coronoid process,

condyloid process, angular process, mandibular foramen, mental foramina

**Appendicular Skeleton**

**Pectoral Girdle:**

scapula (coracoid process, glenoid fossa, dorsal border, cranial border, caudal border, scapular spine, acromion, metacromion, supraspinous fossa, infraspinous fossa, subscapular fossa), clavicle, humerus (head, greater tubercle, lesser tubercle, intertubercular groove, condyle, trochlea, capitulum, olecranon fossa, medial epicondyle lateral epicondyle, supracondylar foramen, body), ulna (trochlear notch, olecranon, coronoid process, radial notch, lateral styloid process), radius (head, radial tuberosity, medial styloid process), manus, carpus, carpal bones, scaphoid, lunate, triquetrum, pisiform, sesamoid bones, trapezium, trapezoid, capitate, hamate, metacarpals, phalanges

**Pelvic Girdle:**

ilium, ischium, pubis, os coxae (acetabulum, crest, obturator foramen, tuberosity of the ischium, symphyses, pelvic canal), femur (head, greater trochanter, lesser trochanter, trochanteric fossa, lateral condyle, medial condyle, epicondyles, intercondyloid fossa), patella, tibia (condyles, tuberosity, crest, medial malleolus), fibula (lateral malleolus), pes, tarsus, tarsal bones, talus, calcaneus, tuber calcanei, sustentaculum tali, navicular, medial cuneiform, intermediate cuniform, lateral cuniform, cuboid, metatarsals, phalanges

# Cat Muscles

**MUSCLE GROUP NAME**

Caudal Hypaxial Muscles External obliques

 Internal obliques

 Transversus abdominis

 Rectus abdominis

 Quadratus lumborum

 Psoas minor

Caudal Epaxial Muscles Multifidus

 Erector spinae

Pectoralis Group Pectoralis superficialis

 (p. descendens & p. transversus)

 Pectoralis profundus ( & xiphihumeralis)

Trapezius & Sternocleidomastoid Group Thoracic trapezius

 Cervical trapezius

 Cleidocervicalis

 Cleidobrachialis

 Sternomastoid

 Cleidomastoid

Superficial Muscles of the Shoulder Omotransversarius

 Acromiodeltoid

 Scapulodeltoid

 Latissimus dorsi

Deeper Muscles of the Shoulder Supraspinatus

 Infraspinatus

 Teres major

 Teres minor

 Rhomboideus cervicis et thoracis

 Rhomboideus capitis

 Serratus ventralis

 Subscapularis

Brachium Tensor fasciae antebrachii

 Triceps brachii

 (long head, lateral head, medial head)

 Anconeus

 Brachialis

 Biceps brachii

 Coracobrachialis

Antebrachium Fasciae antebrachii

Extensor retinaculum

Flexor retinaculum

Brachioradialis

 Extensor carpi ...

 radialis longus

 radialis brevis

 ulnaris

 Extensor digitorum communis

 Extensor digitoum lateralis

 Extensor digiti I

 Extensor digiti II

 Abductor pollicis longus

 Supinator

 Pronator teres

 Flexor carpi radialis

 Flexor carpi ulnaris

 Flexor digitorum superficialis

 Flexor digitorum profundus

 (ulnar head; 2,3,4 heads; radial head)

 Lumbricales

 Pronator quadratus

Lateral Thigh Sartorius

 Tensor fasciae latae

 Biceps femoris

 Semitendinosus

 Caudofemoralis

 Abductor cruris caudalis

Deeper pelvic muscles Gluteus superficialis

 Gluteus medius

 Gluteus profundus

 Piriformis

 Articularis coxae

 Gemellus cranialis

 Gemellus caudalis

 Obturator internus

 Coccygeus

 Quadratus femoris

 Obturator externus

Quadriceps Femoris Complex Vastus lateralis

 Rectus femoris

 Vastus medialis

 Vastus intermedius

Caudomedial Thigh Muscles Gracilis

 Semimembranosus

 Pectineus

 Adductor femoris longus

 Adductor femoris brevis et magnus

Illiopsoas Complex Iliopsoas (Psoas major, Iliacus)

Shank Gastrocnemius

 Flexor digitorum superficialis

 Soleus

 Popliteus

 Flexor digitorum longus

 Flexor hallucis longus

 Flexor digitorum brevis

 Tibialis caudalis

 Tibialis cranialis

 Extensor digitorum longus

 Extensor digitorum brevis

 Extensor hallucis longus

 Extensor digitorum lateralis

 Peroneus longus

 Peroneus tertius

 Peroneus brevis

Cranial Hypaxial Muscles External intercostals

 Internal intercostals

 Transversus thoracis

 Rectus thoracis

 Scalenus

 Serratus dorsalis

 Longus colli

Cranial Epaxial Muscles Splenius

 Spinalis

 Longissimus dorsi

 Longissimus capitis

 Iliocostalis

 Semispinalis cervicis et capitis

Posthyoid Hypobrancial Muscles Sternohyoid

 Sternothyroid

 Thyrohyoid

Prehyoid Hypobranchial Muscles Geniohyoid

 Hyoglossus

 Genioglossus

 Styloglossus

 Lingualis proprius

Mandibular Branchiomeric Muscles Digastric

 Mylohyoid

 Masseter

 Temporalis

Hyoid Muscles Platysma

 Facial muscles

 Stylohyoid

 Stapedius

Caudal Branchiomeric Muscles Thyroarytenoid

 Cricoarytenoid

 Cricothyroid

Other Cutaneous trunci