VERTEBRATE ANATOMY AND PHYSIOLOGY I
SCB 208

COURSE INFORMATION

2 credits, 3 hours: 1 lecture and 2 laboratory

Course Coordinator: Dr. Boris Zakharov
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Section
Instructor: Dr.
Room
e-mail:
Office Hours:
**Lecture Text (required):**  

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic:</th>
<th>Assigned Reading:</th>
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<tbody>
<tr>
<td>2</td>
<td>The Chemistry of life</td>
<td>Text book: Ch. 2: 10-38</td>
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<tr>
<td>3</td>
<td>Cell: structure and function</td>
<td>Text book: Ch. 3: 39-41; 46-82</td>
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<tr>
<td>4</td>
<td>Quiz 1 (weeks 1-3) Tissues</td>
<td>Text book: Ch. 4: 91-114.</td>
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<td>5</td>
<td>Bone and cartilage</td>
<td>Text book: Ch. 4: 114-115; Ch. 6: 153-161</td>
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<td>6</td>
<td>Midterm (weeks 1-5)</td>
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<td>7</td>
<td>Joints and movement</td>
<td>Text book: Ch. 6: 184-190.</td>
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<td>8</td>
<td>Muscles and muscular system</td>
<td>Text book: Ch. 7: 191-204.</td>
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<tr>
<td>9</td>
<td>Muscular system (cont.)</td>
<td>Lab Manual, Ch. 6: 51-54.</td>
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<tr>
<td>10</td>
<td>Quiz 2 (weeks 7-9) Introduction to endocrine system</td>
<td>Text book: Ch. 15: 358-373.</td>
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<td>11</td>
<td>Endocrine system (cont.)</td>
<td>Text book: Ch. 15: 358-373.</td>
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<td>13</td>
<td>Final Exam (weeks 7-12)</td>
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**Laboratory Text (required):**  
*Comparative Anatomy, Manual of Vertebrate Dissection. Third Edition,*  

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<tr>
<th>Week</th>
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<tbody>
<tr>
<td>1</td>
<td>Work with microscope</td>
<td>Textbook: Ch. 3: 42, 73-76.</td>
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<td></td>
<td>Cell and Cellular cycle: Mitosis &amp; Miosis</td>
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<td>2</td>
<td>Tissues and Integumentary system</td>
<td>Textbook: Ch. 4: 90-112; Ch. 5: 131-151.</td>
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<td>Lab-book: Ch. 4: 29-34; Ch. 33: 280-282.</td>
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<td>3</td>
<td>Introduction to the skeleton. Skull bones.</td>
<td>Textbook: Ch. 6: 161-169; Lab-book: Ch. 34: 283-297.</td>
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<td>4</td>
<td>Bones of the spine and forelimb</td>
<td>Textbook: Ch. 6: 169-179; Lab-book: Ch. 34: 297-305.</td>
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<td>5</td>
<td>Quiz 1 (weeks 1-4)</td>
<td>Textbook: Ch. 6: 181-184; Lab-book: Ch. 34: 305-308.</td>
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<td></td>
<td>Bones of the pelvis and hindlimbs</td>
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<td>6</td>
<td>Review of bones</td>
<td>Textbook: Ch. 6: 161-184; Lab-book: Ch. 34: 283-308.</td>
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<td>7</td>
<td>Midterm (weeks 1-6)</td>
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<td>8</td>
<td>Introduction to muscles</td>
<td>Lab-book: Ch. 6: 51-54; Ch. 35: 309-310.</td>
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<td>9</td>
<td>Muscles of the head and trunk</td>
<td>Lab-book: Ch. 35: 310-325</td>
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<td>10</td>
<td>Limbs and caudal muscles</td>
<td>Lab-book: Ch. 35: 325-342.</td>
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11 | Quiz 2 (weeks 8-10)  
    | Review of muscles  
    | Lab-book: Ch. 35:  
    | 310-342.  

12 | Laboratory Final (weeks 8-11)  

Note: please bring laboratory text to all lab classes

**GRADING CRITERIA**

- Attendance is **mandatory** for both the lecture and the laboratory. Any absences must be verified by a doctor’s note.
- A student who misses an exam without a valid, documented excuse will receive a zero for that exam.
- More than two latenesses will result in a five-point deduction from the exam following the infraction.

**Lecture:**  
There will be three announced quizzes, two before the midterm and one after the midterm. The lowest quiz grade will be dropped. There will be a midterm and a final. The final is not cumulative.

**Laboratory:**  
Note that there is a strict **no food, no drink, no smoking and no open toed shoe policy** in the laboratory. Students who fail to comply with these rules may not participate in the laboratory. There will be two announced written quizzes, one before the midterm and one after the midterm. The lower grade will be dropped. There will be a practical midterm and a practical final exam. The final will not be cumulative.

**Calculation of Course Grade**

Lecture (50%)
- Quizzes 10%
- Midterm exam 20%
- Final Exam 20%

Laboratory (45%)
- Quizzes 5%
- Midterm exam 20%
- Final Exam 20%

Class Participation 5%

100%
GRADING CRITERIA

Final Grades
92.5-100 = A  86.5-89.4 = B+  76.5-79.4 = C+  66.5-69.4 = D+  0-59.4 = F
89.5-92.4 = A-  82.5-86.4 = B  72.5-76.4 = C  62.5-66.4 = D
79.5-82.4 = B-  69.5-72.4 = C-  59.5-62.4 = D-

CHEATING POLICY
Anyone caught cheating at any time receives a zero for that exam.
The student may refer to the school policy on academic integrity for further information.

COURSE CONDUCT

Cell phones and beepers are to be turned off during class. If there is an extreme emergency, please inform the instructor at the beginning of class, and set the instrument to vibrate. Texting during class is prohibited.

DO NOT ARRIVE LATE!!
It is rude to your classmates and disruptive to the class for students to arrive late. Lateness will affect your course grade.

The student is strongly encouraged to keep up with the lecture and laboratory material, as there is a large volume of information to assimilate. You are urged to seek assistance if and as soon as you feel that you are having difficulty, rather than waiting until examination dates are imminent.

The professor’s office hours will be announced in class; other appointments can be made if needed.
Course Lectures’ Objectives

**Lecture 1**
- Definitions of the terms “Anatomy” and “Physiology”
- Hierarchy of levels of the body organization and function
- Concept of homeostasis
- Anatomical terminology: planes of the body, relative organ’s positions, and direction’s nomenclature
- General characteristics of vertebrates

**Lecture 2**
- Types of chemical bonds
- Unique properties of water molecules
- Acids, bases, and salts
- Definition of organic and inorganic molecules
- Description of four major types of organic molecules
- Carbohydrates: their structure and function in organism
- Lipids: triglycerides, cholesterol and steroids, phospholipids and cellular membranes
- Proteins: structure and role in organism, enzymes, and transport proteins
- Nucleic acids: structure, role in life, chromosomes.

**Lecture 3**
- Cellular theory of life organization
- Plasma membrane: structure and function. Osmosis. Transport across membrane. Pumps (Sodium-Potassium pump)
- Cell-to-cell junctions
- Nucleus
- Endoplasmic reticulum
- Ribosomes
- Golgi apparatus
- Lysosomes and piroxisomes
- Mitochondria
- Cell cycle

**Lecture 4**
- Quiz 1 (on material from lectures 1 – 3)
- List and describe the major types of bones
- Explain the major characteristics of the gross and microscopic anatomy of bone
- Describe the difference between compact and cancellous bone
- Describe normal bone development, and contrast it with remodeling and repair functions
- Mechanism of bone tissue homeostasis
- Factors that affect normal bone development, growth and repair
- Cartilage tissue
- Describe normal cartilage development, and how it differs from bone development
• Explain the difference between axial and appendicular skeleton

Lecture 5
• Classification of joints
• Description of synovial joints: their organization and classification
• Classification of movements

Lecture 6
• Midterm exam

Lecture 7
• Major functions of muscular system
• Differentiate skeletal, smooth, and cardiac muscle
• Orientation of muscle fibers and muscles classification
• Bone-muscle lever system
• Definitions of prime mover, antagonist, and synergist
• Isotonic and isometric contractions
• Description of smooth muscles: their organization, classification, and function
• Cardiac muscle: construction and function
• Embryonic origin of muscles

Lecture 8
• Skeletal muscle construction
• Sliding filament model of muscle contraction and relaxation
• Energy sources and oxygen debt
• Fast and slow twitch muscle fibers

Lecture 9
• Neuromuscular junction
• Nervous impulse and muscular contraction coupling
• Summation and recruitment of motor units
• Proprioceptors and regulation of muscle activity
• Muscle atrophy and muscle tone
• Stay apparatus
• Difference between locomotion and flight

Lecture 10
• Quiz 2
• Introduction to endocrine system
• Definition of endocrine and exocrine glands
• Comparison of nervous and endocrine systems
• Relations between nervous and endocrine systems

Lecture 11
• What is a signaling molecule?
• Control of hormonal production
• Classification of hormones
• Non-steroid hormones: structure and function
• Hormone and its receptor
• Steroid hormones and intracellular receptors

Lecture 12
• Hypothalamus
• Pituitary gland
• Hypothalamic - pituitary axis
• Thyroid gland
• Parathyroid glands
• Adrenal glands
• Ovary and testes
• Pineal gland

LABORATORY GUIDELINES

LABORATORY I

Laboratory Specimens:
Microscopic slides of mitosis and miosis.
Slides of different tissue types: epithelial, connective, muscular, and nervous tissues.

Students will learn to work with microscope. They will observe and discuss different types of cellular division.

Students will study four types of tissue and their characteristics. Discussion will include connection between tissue structure and function.

LABORATORY II

Specimens:
Microscopic slides of epithelial and connective tissues, and integument.

From a diagram, student will be able to identify parts of the equine hoof, and explain differences from the ruminant hoof

Students will continue study four types of tissue and their characteristics. They will study structure of skin and integument accessory organs (hair, nails, and claws). Discussion will include connection between tissue structure and function.

LABORATORY III
Specimens:
Cat skeletons

Student will distinguish areas of bone from areas of cartilage

Student will be able to identify bones of the skull: nasal, incisive, frontal, parietal, postparietal, temporal, sphenoid, ethmoid, occipital, zygomatic, zygomatic arch, lacrimal, maxilla, mandible, palatine, Inferior nasal concha, Vomer, Tympanic bulla.
Mandible: Coronoid process, Condyloid process, Angular process, Ramus, Canines, Premolars, Molars, Mental foramen, Mandibular foramen, Masseteric fossa.
External Acustic Meatus, Occipital condyle, Mandibular condyle, Foramen Magnum, Mastoid process, Optic foramen, Foramen Ovale, Palatine Foramen, Incisive foramen, Lacrimal foramen, cranial sutures: Frontal, Sagital, Squamous, and hyoid apparatus

Student will be able to distinguish the terms: process, foramen, condyle, and ramen

Student will be able to identify major joints (atlanto-occipital, scapulohumeral, coxofemoral, humeroradial, femorotibial, carpus, tarsus, metacarpal, phalangeal)

Student will distinguish long, flat, and irregular bones

**Laboratory IV**

Cat skeletons

Identify the following:
Atlas; Axis: Dens; Cervical spine; Thoracic spine; Lumbar spine; Caudal spine; Neural processes, Lamina, Pedicle, Neural canal, Transverse Process, Transverse foramen, Centrum, Sacrum.
Sternum: Manubrium, Sternebra, Xiphisternum, Xiphoid cartilage, Costal cartilage, rib, capitulum, neck, tuberculum.
Scapula – including spine, Metacromion, acromion, Coracoid process, glenoid fossa, supraspinous fossa and infraspinous fossa, Subscapular fossa.
Humerus – including head, greater tuberosity, lesser tuberosity, bicipital groove, supracondylar foramen, lateral and medial epicondyles, deltoid ridge, Coronoide fossa, Olecranon fossa, Capitulum, Trochlea.
Radius – including head, neck, bicipital tuberosity, styloid process.
Ulna – including olecranon, trochlear notch, coronoid process, Radial notch, styloid process.
Carpus: Metacarpals (know their numbering as well!), Proximal, middle, and distal phalanges.
Tarsus, Metatarsus, Calcaneum, Astragulus, Phalanges.

**Laboratory V**

Quiz 1(weeks 1-4).

Cat skeletons:
Pelvis – including ilium, iliac crest, ischium, pubic bone, acetabulum, obturator foramen, pelvic symphysis, Ischial tuberosity.
Femur – including head, greater trochanter, trochanteric fossa, neck, lesser trochanter, medial and lateral epicondyles, medial and lateral condyles, patellar trochlea, Intercondyloid fossa, patella.
Tibia – including lateral and medial condyles, tibial tuberosity, tibial crest, medial malleolus.
Fibula – including head and lateral malleolus.

**Laboratory VI**

Cat skeleton:

Review of bones

**Laboratory VII**

Midterm

**Laboratory VIII**

Cat specimens:

Latissimus dorsi; Spinotrapezius; acromiotrapezius; Clavotrapezius; Clavodeltoid; Acromiodeltoid; Spinodeltoid; Levator scapulæ ventralis; Supraspinatus; Infraspinatus; Pectoantebrachialis; Pectoralis major; Pectoralis minor; Xiphihumoralis; Sternomastoid; Sternohyoid; Triceps brachii (all three heads); Brachialis; Brachioradialis; Extensor muscles of brachium; Flexor muscles of brachium

**Laboratory IX**

Cat specimens

Gluteofemoralis; Gluteus maximus; Gluteus medius; Tensor fascia latae; Biceps femoris; Sartorius; Semimembranosus; Semitendinosus; Gracilis; Adductor femoris; Adductor longus; Pectineus; Iliopsis; Vastus lateralis; Vastus medialis; Rectus Femoris; Gastrocnemius; Soleus; Tenissimus; Tibialis anterior; Cancaneal tendon.

**Laboratory X**

Quiz 2

Cat specimen:

Subscapularis; Serratus dorsalis cranialis; Serratus dorsalis caudalis; Serratus ventralis; External intercostals; Internal intercostals; Lambodorsal aponeurosis; Linea alba; External oblique;
Internal oblique; Transversus abdominis; Rectus abdominis; Rhomboides minor; Rhomboides Major; Teres major.

**Laboratory XI**

Cat Specimen:

Review of muscles for the Final Exam

**Laboratory XII**

Final exam (weeks 8-11).

**University Resources**

**Disabilities Act:**
If you have a physical, psychological or learning disability which may interfere with your ability to complete assignments, then please contact Disabled Student Services (DSS), Room M-102 / 718-482-5279. They will review your concerns and determine with you, what accommodations are necessary and appropriate. All documentation of and information regarding disabilities is confidential. **You must register with the Disabilities Office to receive special accommodations.**

**The Writing Center:**
The Writing Center, Room B-200, offers tutoring in writing skills and assistance on individual papers, both for this class and others. The Center is open Monday-Friday from 9:15am-9:00pm.

**The Counseling Center:**
The Counseling Center offers a variety of services designed to enhance students’ academic, career and personal development. Among the services offered are:

1. Educational planning
2. Career Counseling
3. Personal Counseling (i.e., family issues, anxiety, depression, etc.)
4. Academic Advisement

Services are free to LAGCC students, and the Counseling Center is located in B-100 and can be reached at 718-482-5250.
College regulations regarding cheating will be strictly enforced. The policy on academic integrity is available at the following address:

http://library.laguardia.edu/files/pdf/academicintegritypolicy.pdf