

**BIOLOGY 2011  
HUMAN ANATOMY-MSK  
("Where one has to work their phalanges to the periosteum!")  
2018**

**COURSE SYLLABUS/LAB MANUAL**





## **General Information: Lecture and Laboratory Examinations**

There is one Lecture Exam and a Final Exam and two laboratory examinations. The lecture exam will consist of a variety of questions (mostly fill-in-the-blank type, T/F, and MCQ), will be written during class time and will be worth approximately 100-150 marks. The Final exam will be primarily fill-in-the-blank, T/F, MCQ, short answer, clinical corner, and will consist of approximately 200-300 marks. Eighty (80) minutes and three (3) hours will be allotted for the exams, respectively. The final exam will be cumulative.

There are two lab exams and will include approximately 25-50 stations. Each station will have between 2 and 4 "tags" which you will identify within a set period of time. This type of exam is affectionately known as a BELL RINGER (BRE)! You will be tested on bones, models, radiological, and histological materials. Bonus questions will most likely be included in lab tests, and therefore it is possible to score greater than 100% on the lab exam component.

All exams are rounded up to the nearest whole number. Therefore, no additional marks are awarded individuals at the end of the course.

Students earning a mark of 70% or greater at the completion of this course will be eligible to serve as Teaching Assistants in succeeding years. This is an excellent learning experience and a great way to earn money. Teaching assistants are selected by the Instructor and while a minimum of 70% is required, earning 70% or better does not in itself entitle anyone to serve as a T.A. While scores earned may serve as one of the factors in making the selection, other factors such as communication skills, ability to get along with others, positive attitudes, etc. will also be used in making the selection. The number of T.A.'s hired each year depends upon course enrollment and budgetary considerations.

I welcome you to Biology 2011 and hope that your experience in human anatomy will be a stimulating and enjoyable one. If you encounter difficulties, don't endure them in isolation. Often much can be done to help. Don't wait until problems are unmanageable to seek help!

## Biology 2011 - Policies

The policies set out below are for the students' benefit. These policies are somewhat stringent and inflexible. Given the fact that approximately 150 students are enrolled in this course, it necessitates some structure pertaining to writing and marking of exams. These policies are set forth to ensure that all students are treated fairly.

1. All tests must be written in pen to be eligible for mark revision.
2. Simple adding mistakes should be given to Donna Newhouse for correction.
3. When exams are returned, the student has one week to challenge any discrepancies in marking/grading. After one week no mark adjustments will take place. It is therefore in your best interest to review your marked paper when they are returned.
4. If you feel you deserve more marks for a question, attach a note to your paper explaining which question(s) should be re-marked and why. However, should you submit your exam it will be marked in its entirety and thus there is a chance the initial mark may decrease.
5. In the event that a student has to miss a lab or lecture exam for emergency reasons, it will be the student's responsibility to get in touch with Donna Newhouse prior to the scheduled exam.
6. In the event that a student has to miss a lab or lecture exam for medical reasons, the student must submit a signed medical note (from the attending physician) within 7 days after the exam. It is the student's responsibility to get in touch with Donna. Failure to comply with points 5 or 6 will result in a grade of zero for the exam.
7. You may come to lab periods other than your own to do extra studying BUT the regularly scheduled students have priority access to models, equipment and help from the T.A.'s.
8. Video or photographic equipment is/are NOT permitted in the laboratory at any time.
9. All laboratory specimens and models must be treated with the utmost respect and care. The human bones are fragile and irreplaceable. If any breakage should occur please report this to a TA or Donna.
10. There is an established chain of command should you have any problems associated with this course. The chain of command is as follows: T.A.'s...Donna Newhouse...Chairman of Biology...Dean of Science and Environmental Studies...V.P. Academics...Dr. McPherson. Issues or problems should be resolved at the lowest level possible (Dr. McPherson shouldn't have to resolve the problem of a half mark injustice on a lab exam!).

## LABORATORY SCHEDULE 2018

### **BLOCK 1:**

September 11 - October 3

Integument, Bones and Joints

October 16, 17

LAB EXAM #1

Everyone will write during their assigned lab time

### **BLOCK 2:**

October 23 - November 21

Muscles (and some bones)

November 27, 28

LAB EXAM #2

# LECTURE OUTLINE

(Subject to Change)

## I. Introduction

- A. Definition of Anatomy
- B. Anatomical Position, Planes, Movements
- C. Organization of the body
  - (1) cells
  - (2) tissues
  - (3) organs
  - (4) organ systems
  - (5) membranes (serous, synovial, mucous, cutaneous)
- C. Anatomical Terminology

## II. Connective Tissue

- A. Composition
  - (1) cells
  - (2) ground substance (matrix)
  - (3) fibres
- B. Types
  - (1) areolar (loose)
  - (2) white fibrous
  - (3) yellow fibrous (dense elastic)
  - (4) reticular
  - (5) lymphoid
  - (6) adipose
  - (7) vascular
  - (8) cartilaginous
  - (9) osseus

## III. Integumentary System

- A. Functions of the Skin
- B. Structure of the Skin
- C. Accessory Structures of the Skin
- D. Clinical considerations

#### IV. Skeletal System (Osseous connective tissue)

##### A. Skeletal Development and Function

- (a) composition and structure of bones

##### B. Review of Human Bones

###### (1) axial division

- (a) skull (cranium, facial bones)
- (b) hyoid bone
- (c) trunk (vertebrae, ribs, sternum)

###### (2) appendicular division

- (a) upper (pectoral) appendages
- (b) lower (pelvic) appendages

##### C. Joints

- (1) synarthroses
- (2) amphiarthroses
- (3) diarthroses
- (4) types of movement across joints
- (5) types of joint injuries

#### V. Muscular System

##### A. Muscle Tissue

- (1) skeletal (striated)
- (2) smooth (unstriated)
- (3) cardiac
- (4) properties of muscle tissue
- (5) functions
- (6) structure of skeletal muscles

##### B. Principle muscles of the body

###### (1) Muscles of facial expression

###### (2) Muscles of upper extremity

- (a) shoulder joint
- (b) muscles moving the shoulder
- (c) muscles moving the upper arm
- (d) muscles moving the lower arm
- (e) muscles which move the hand
- (f) muscles which move the fingers and thumb (forearm/hand)

###### (3) Muscles of the lower extremity

- (a) hip joint
- (b) muscles which move the thigh
- (c) muscles which move the lower leg
- (d) muscles which move the foot and toes

###### (4) Muscles of the abdominal wall

###### (5) Muscles that move the head and spine

###### (6) Muscles of the pelvic floor

###### (7) Muscles which move the chest wall

## **LABORATORY OUTLINE SKELETAL SYSTEM AND JOINTS**

The following is a list of the bones and their parts that you are required to know for lab. (There may be additional structures that you should know from diagrams for lecture tests). Please note that you should also be able to tell if major bones are from the right or left side, which end is proximal or distal and with which bone(s) they articulate.

Histology: You are responsible for the following slides:

Slide 1: Integument. Description will be available in lab

Slide 2: Adipose connective tissue. You may have to dim the light on your microscope to see the walls of the fat cells. Since the interior of the cell is full of fat, it looks empty but its cytoplasm and nucleus have been pushed against the wall and in some cells are visible. The walls are very thin and the cells are packed closely together giving them irregular shapes.

Slide 3: Elastic cartilage. The cartilage is the broad band of pale purple. The matrix itself stains pale purple and within it are spaces called lacunae. Within the spaces are the cartilage cells - the chondrocytes. The elastic fibres are the fine strands running through the matrix.

Slide 4: Hyaline cartilage. On this slide, the cartilage is the area of lacunae (stained purple). It has the chondrocytes just as elastic cartilage does but there are no elastic fibres.

Slide 5: Compact bone. The characteristic of this slide is the Haversian system that is found only in compact bone. Although they are not visible, the osteocytes are in the lacunae.

Slide 6: Cancellous (spongy) bone. There is no Haversian system (see slide 5), only irregular rods of bone (called trabeculae) are produced that form a network filled with marrow. The bone is stained bright red or pink, depending on the slide, and the cells that produce the bone (osteocytes) are visible in the lacunae.

Slide 7. Pacinian (lamellated) corpuscle. These are either sections of skin or organs that have deep pressure sensors. Look for large round structures that consist of many concentric circles. They have the appearance of the cut surface of an onion.

## Integument

### Epidermis

stratum corneum	stratum lucidum	stratum granulosum
stratum spinosum	stratum basale	

### Dermis

papillae	touch corpuscles of Meissner's
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### Hypodermis

Adipose	lamellated corpuscles	
sudoriferous "sweat" glands	hair shaft	root
hair bulb	hair papilla	sebaceous glands
arrector pili mm	Pacinian corpuscles	

## 1. Skull (see Appendix A)

### A. Cranium

#### Frontal bone:

Sinuses	supra-orbital margin	supra-orbital notch (foramen)
coronal suture		

#### Parietal bone:

Squamosal suture	lambdoidal suture	sagittal suture
grooves of middle meningeal arteries		

#### Temporal bone:

Mastoid process	mandibular fossa	zygomatic process
stylomastoid foramen	styloid process	petrous portion
squamous portion		
external auditory (acoustic) meatus		
internal auditory (acoustic) meatus		

#### Occipital bone:

Foramen magnum	occipital condyles	jugular foramen
hypoglossal (canal) foramen		
groove of transverse sinus		
groove of sigmoid sinus		

#### Sphenoid bone:

Sinuses	foramen ovale	optic foramina,
foramen rotundum	foramen spinosum	sella turcica
superior orbital fissure		
inferior orbital fissure		

#### Ethmoid bone:

Crista galli	cribriform foramina (plate),
perpendicular plate	

### B. Facial Bones

#### Maxilla:

Sinuses	palatine process	alveolar process,
infraorbital foramina		

#### Mandible:

Condylod process	coronoid process	ramus
alveolar border	angle	mental foramen
mandibular foramen	lingula	body
symphysis (mental protuberance)		

#### Nasal bones

Lacrimal bones

Inferior nasal conchae

Zygomatic bones

Vomer bone

Palatine bone

C. Ear Ossicles

Malleus

Incus

Stapes

(\*\*Hammer, anvil and stirrup are NOT acceptable!)

Hyoid Bone

Greater horn

lesser horn

body

Vertebrae General features:

Body

pedicle

lamina

superior articular surface

transverse process

spine (spinous process)

inferior articular surface

transverse foramina (if present)

Types: (look up the structures unique to these vertebrae including Atlas and Axis)

Cervical

Thoracic

Lumbar

Sacrum:

Ala

body

anterior sacral foramina

posterior sacral foramina

Coccyx

Ribs:

Head

neck

tubercle

costal groove

Sternum:

Jugular notch

manubrium

sternal angle

Body

xiphoid process

**Scapula:**

Vertebral (medial) border		axillary (lateral) border,
glenoid fossa (cavity)	acromion	spine
supraspinous fossa	infraspinous fossa	inferior angle
subscapular fossa	coracoid process	

**Clavicle:**

Medial (sternal) end	lateral (acromial) end	conoid tubercle
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**Humerus:**

Head	deltoid tuberosity	capitulum
coronoid fossa	olecranon fossa	trochlea
medial epicondyle	lateral epicondyle	intertubercular groove
greater tubercle	lesser tubercle	

**Ulna:**

Semilunar (trochlear) notch	olecranon	coronoid process
radial notch	head	styloid process

**Radius:**

Head	radial tuberosity	neck	styloid process
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**Carpals (wrist bones):**

Scaphoid	Lunate	Trapezium	Capitate
Triquetral (triquetrum)	Pisiform	Trapezoid	Hamate

**Hand (Manus) Bones:**

Metacarpals	phalanges (distal, middle, proximal)
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**Coxal (Hip) Bones:**

Ilium	ischium	pubis
symphysis pubis	acetabulum	obturator foramen
greater sciatic notch	lesser sciatic notch	ischial spine
anterior superior iliac spine		
anterior inferior iliac spine		
posterior superior iliac spine		
posterior inferior iliac spine		
ischial tuberosity		

**Femur:**

Head	linea aspera	neck
lateral condyles	medial condyle	intercondylar fossa
lateral epicondyle	medial epicondyle,	
greater trochanter	lesser trochanter	

**Patella:**

Base	apex
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**Tibia:**

Lateral condyle	medial condyle	tibial tuberosity	medial
malleolus	intercondylar eminence		

**Fibula:**

Head	lateral malleolus
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**Tarsal (Ankle) Bones:**

Talus, 1 <sup>st</sup> (medial), 2 <sup>nd</sup> (intermediate), 3 <sup>rd</sup> (lateral)	navicular	cuboid	calcaneus
	cuneiform		

**Foot Bones:**

Metatarsals	phalanges (distal, middle, proximal)
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**Model of Bone:**

Periosteum	lamellae	Sharpey's fibres	osteon
osteocyte	Volkman's canal		

**The following is a list of structures associated with the knee, shoulder, elbow, and hip joints which you are responsible to know:**

**Knee:**

anterior cruciate ligament	posterior cruciate ligament,
medial meniscus	lateral meniscus
medial (tibial) collateral ligament	
lateral (fibular) collateral ligament	
posterior menisiofemoral ligament	
quadriceps tendon	
patellar ligament	

**Shoulder:**

acromioclavicular ligament	coracoclavicular (conoid & trapezoid) lig
coracoacromial ligament	coracohumeral ligament
long head of biceps tendon	transverse humeral retinaculum
superior transverse scapular ligament	

**Elbow:**

medial collateral ligament	lateral collateral ligament
annular ligament	

**Hip:**

iliofemoral ligament	ischiofemoral ligament
pubofemoral ligament	

## MUSCULAR SYSTEM

This section lists what you need to know for both the cat and the human in the lab portion of the course. In addition to being able to identify muscles, you are responsible for origin(s), insertion(s) and action(s) for the major muscle groups in the human. The only tendon you should know is the Achilles (calcaneal) tendon.

### Histology:

You are responsible for the microscopic anatomy of the three types of muscles. The three types of muscle are available separately in slides 10, 11, and 12 and together on slide 9.

Slide 8: Striated (skeletal) muscle. This is the major component of skeletal muscles, which pull on bones to cause body movements. Skeletal muscle fibres are long, large cylinders that contain many nuclei. Notice the obvious banding pattern and the fact that these large cells are multinucleated.

Slide 9: Smooth muscle. It is so named because there are no visible striations in its fibres. These fibres are spindle-shaped and contain one centrally located nucleus. Smooth muscle primarily occurs in the walls of hollow organs. It generally acts to squeeze substances through these organs by alternately contracting and relaxing

Slide 10: Cardiac muscle. Cardiac muscle is found in the walls of the heart. It contracts to propel blood through the blood vessels. Like skeletal muscle fibres, cardiac muscle fibres are striated. However, they differ in two ways: (1) cardiac fibres are generally uninucleated (one nucleus) and (2) cardiac cells branch and join at unique cellular junctions called intercalated discs.

You are not responsible for identifying muscle types in cross section (xs), only in longitudinal section (ls).

The following is a list of muscles you should know in the human:

### Head/Neck Region

masseter	sternocleidomastoid
temporalis (temporoparietal)	sternohyoid
buccinator	sternothyroid
orbicularis oris	thyrohyoid
orbicularis oculi	stylohyoid
frontalis (occipitofrontalis)	anterior scalene
occipitalis (occipitofrontalis)	middle scalene
zygomaticus (major + minor)	posterior scalene
platysma	levator scapulae

### Thoracic/Abdominal Region

pectoralis minor	rectus abdominis
pectoralis major	transversus abdominis
internal abdominal oblique	serratus anterior
external abdominal oblique	intercostals (internal/external)

### Back Region

latissimus dorsi	rhomboideus major
erector spinae	trapezius
rhomboideus minor	quadratus lumborum

### Upper Extremity

teres minor	extensor carpi radialis longus
teres major	extensor carpi radialis brevis
supraspinatus	brachioradialis
infraspinatus	extensor digitorum
subscapularis	extensor carpi ulnaris
deltoid	flexor pollicis brevis
Serratus anterior	abductor pollicis brevis
Pectoralis major	extensor pollicis brevis
Pectoralis minor	extensor pollicis longus
biceps brachii (long & short heads)	adductor pollicis
brachialis	abductor pollicis longus
coracobrachialis	supinator
Pronator teres	pronator quadratus
Flexor carpi radialis	Opponens pollicis
Palmaris longus	
Triceps brachii (long, lateral & medial)	abductor digiti minimi
Flexor carpi ulnaris	
Flexor digitorum superficialis	flexor digiti minimi
Flexor digitorum profundus	opponens digiti minimi
	lumbricales

## Lower Extremity

iliacus	semitendinosus
psoas major	semimembranosus
psoas minor	biceps femoris (long & short heads)
piriformis	tibialis anterior
iliopsoas	extensor hallucis longus
tensor fasciae latae	extensor digitorum
sartorius	peroneus longus
superior gemellus	peroneus brevis
inferior gemellus	gastrocnemius
obturator internus	soleus
gluteus maximus	plantaris
gluteus medius	popliteus
gluteus minimus	flexor hallucis longus
rectus femoris	tibialis posterior
vastus lateralis	flexor digitorum longus
vastus medialis	iliotibial band (ITB)
vastus intermedius	inguinal ligament
pectineus	obturator externus
adductor longus	quadratus femoris
adductor brevis	
adductor magnus	
gracilis	