BIOLOGY 2011
HUMAN ANATOMY-MSK
("Where one has to work their phalanges to the periosteum!")
2015

COURSE SYLLABUS/LAB MANUAL

BIOLOGY 2011

HUMAN ANATOMY - MSK

Instructor: Donna Newhouse, M.Sc., Ph.D(c)
Office: MS 3009 **Phone:** 766-7387 (NOSM) or 474-9016 (Cell)
E-Mail: Donna.Newhouse@Lakeheadu.ca

Required Texts: Principles of Human Anatomy (12e).
Author: Tortora & Nielsen (2011)

Atlas of Human Anatomy (4e.).
Author: Netter (2007)

Mark Breakdown:

Lecture:	2 term exams:	1. Lec Exam: Integument, Bones and Joints October 15thth, 2015 20% of final grade
		2. Final Exam: Integument, Bones, Joints, Muscles (TBA) 40% of final grade
Lab:	2 term exams:	1. Bones and Joints Oct 20th, 21st, 2015 20% of final grade
		2. Muscles (Bones and Joints) Nov. 24th, 25th, 2015 20% of final grade

**Dates are subject to change

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 forthe 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. Stevenson. Issues or problems should be resolved at the lowest level possible (Dr. Stevenson shouldn't have to resolve the problem of a half mark injustice on a lab exam!).

LABORATORY SCHEDULE 2015

BLOCK 1:	
September 21 - October 8	Integument, Bones and Joints
October 20, 21	LAB EXAM #1 Everyone will write during their assigned lab time
BLOCK 2:	
October 27 - November 20	Muscles (and some bones)
November 24, 25	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

Hypodermis

Adipose	lamellated corpuscles	
sudoriferus "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:

Condyloid 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

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

Carpals (wrist bones):

Scaphoid
Lunate
Trapezium
Capitate
Triquetral (triquetrum)
Pisiform
Trapezoid
Hamate

Hand (Manus) Bones;

Metacarpals
phalanges (distal, middle, proximal)

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

Tibia:		
Lateral condyle	medial condyle	tibial tuberosity medial malleolus
intercondylar eminence		

Fibula:	
Head	lateral malleolus

Tarsal (Ankle) Bones:			
Talus,	navicular	cuboid	calcaneus
1st, 2nd, 3rd cuneiform			

Foot Bones:	
Metatarsals	phalanges (distal, middle, proximal)

Model of Bone:		
Periosteum	lamellae	Sharpey's fibres osteon
osteocyte	Volkmann'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 meniscofemoral 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
temporalis (temporoparietal)
buccinator
orbicularis oris
orbicularis oculi
frontalis (occipitofrontalis)
occipitalis (occipitofrontalis)
zygomaticus (major + minor)
platysma
sternocleidomastoid
sternohyoid
sternothyroid
thyrohyoid
stylohyoid
anterior scalene
middle scalene
posterior scalene
levator scapulae

Thoracic/Abdominal Region

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

Back Region

latissimus dorsi
erector spinae
rhomboideus minor
rhomboideus major
trapezius
quadratus lumborum

Upper Extremity

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

Lower Extremity

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