

**BIOLOGY 2011**  
**HUMAN ANATOMY - MSK**  
(“Where one has to work their phalanges to the periosteum!”)  
**Spring 2019**

**LAB MANUAL**



**BIOLOGY 2011**  
**HUMAN ANATOMY- MSK**  
**Spring 2019**

**Instructor:** Donna Newhouse, M.Sc., Ph.D(c)

**Office:** MS 3009     **Phone:** 766-7387 (NOSM) or 474-9016 (Cell)

**E-Mail:** Donna.Newhouse@nosm.ca

**Required Texts:**

1. Principles of Human Anatomy (14e). Author: Tortora, G. (2017)

2. Atlas of Human Anatomy (6e.). Author: Netter (2017)

3. "Inhouse" Laboratory Manual for Biology 2020. Donna Newhouse (2018)

**Teaching Assistants:**

Jonathon Avella

**\*\*Mark Breakdown:**

Lecture:    2 Exams:

1. MT Exam: Integument & Bones [30%]

(May 10th; 6:00 pm)\*\*

2. Final Exam: Bones and Muscles [30%]

(May 23rd; 6:00 pm)\*\*

Lab:            2 Lab Exams:    1. Integument & Bones (May 10th; 8:00 pm)\*\*

2. Bones & Muscles (May 23rd; 8:00 pm)\*\*

**\*\*Dates/times are subject to change**

**General Information: Lecture**

There are a total of two lecture exams (MT & Final) and two laboratory examinations. The two lecture exams will consist of a variety of questions (mostly fill-in-the-blank type, T/F, MC). The midterm exam will be approximately 125-200 questions. The Final exam will be primarily fill-in-the-blank, short answer, clinical corner, and will consist of approximately 150-300 marks. The Midterm (MT) Exam will cover information from May 1<sup>st</sup> – May 9<sup>th</sup>, and the Final Exam will cover information from MT – May 22<sup>nd</sup>.

**General Information: Laboratory Examinations**

There will be a total of two lab exams. Each lab exam 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! You will be tested on bones, models, prosected specimens, radiological, and histological materials.

I welcome you to Biology 2011 (Spring 2019) 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. 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 may 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. A message may be left at 474-9016.
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. Video or photographic equipment is/are NOT permitted in the laboratory at any time.
8. 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.
9. 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!)

**\*\*Subject to Change**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	<b>April 30</b>	<b>April 30</b>	<b>May 1 LAB (LEC) Integument &amp; Bones 6:00-8:00 pm CB 3012</b>	<b>May 2 LAB (LEC) Integument &amp; Bones 6:00-8:00 pm CB 3012</b>	<b>May 3 LAB (LEC) Bones 6:00-8:00 pm CB 3012</b>	<b>May 4</b>
<b>May 5</b>	<b>May 6 LECTURE ATAC 1007 6:00-9:00 pm</b>	<b>May 7 LECTURE ATAC 1007 6:00-9:00 pm</b>	<b>May 8 LEC &amp; LAB Bones 6:00-9:00 pm</b>	<b>May 9 LAB Bones 6:00-9:00 pm</b>	<b>May 10 LEC &amp; LAB EXAM 6:00-10:00 pm</b>	<b>May 11</b>
<b>May 12</b>	<b>May 13 LECTURE ATAC 1007 6:00-9:00 pm</b>	<b>May 14 LEC &amp; LAB Muscles 6:00-10:00 pm</b>	<b>May 15 LEC &amp; LAB Muscles 6:00-10:00 pm</b>	<b>May 16 LEC &amp; LAB ATAC 1007 6:00-10:00 pm</b>	<b>May 17 LEC &amp; LAB ATAC 1007 6:00-10:00 pm</b>	<b>May 18</b>
<b>May 19</b>	<b>May 20 HOLIDAY (Woot Woot!)</b>	<b>May 21 LEC &amp; LAB AT 1007 6:00-10:00 pm</b>	<b>May 22 LEC &amp; LAB ATAC 1007 6:00-10:00 pm</b>	<b>May 23 LEC &amp; LAB EXAM 6:00-10:00 pm</b>	<b>May 24</b>	<b>May 25</b>

## LECTURE OUTLINE

(Subject to Change)

### I. Introduction

A. Objectives of the course

### II. Integumentary System

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

A. 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

B. Muscular System

a) properties of skeletal muscle tissue

b) structure and function of skeletal muscles

C. Principle muscles of the body

(1) Muscles of facial expression & mm. that move the axial skeleton

(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

## SKELETAL SYSTEM AND JOINTS

You are responsible for the ligaments associated with the knee, shoulder, elbow, and hip. Models are available for this purpose.

The following is a list of the bones and their parts that you are required to know for lab. 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.

### Integument

#### Epidermis

stratum. corneum	stratum lucidum	stratum granulosum
stratum spinosum	stratum basale	

#### Dermis

papillae	touch corpuscles (Meissner's)
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#### Hypodermis

Adipose	lamellated corpuscles	
sudoriferus (sweat) gland	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:

Condylloid 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

superior articular surface

spine (spinous process)

transverse foramina (if present)

pedicle

transverse process

inferior articular surface

lamina

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

(You are not responsible to be able to tell the ribs apart, except for the unique ones such as the floating ribs)

**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	
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)
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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 malleolus	medial condyle intercondylar eminence	tibial tuberosity medial
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**Fibula:**

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

Talus, 1st, 2nd, 3rd cuneiform (medial, intermediate, lateral)	navicular	cuboid	calcaneus
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**Foot Bones:**

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

Periosteum osteocyte	lamellae Volkmann's canal	Sharpey's fibres osteon
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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.

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)

Flexor carpi ulnaris  
Flexor digitorum superficialis  
Flexor digitorum profundus

abductor digiti minimi  
flexor digiti minimi  
opponens digiti minimi  
lumbricals

## 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