

BIOLOGY 2011
HUMAN ANATOMY-MSK
“Where one has to work their phalanges to the periosteum!”
2020

COURSE SYLLABUS/LAB MANUAL



BIOLOGY 2011
HUMAN ANATOMY - MSK

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Required Texts: Principles of Human Anatomy (13e).
 Author: Tortora & Nielsen (2017)

Atlas of Human Anatomy (7e.).
 Author: Netter (2017)

Mark Breakdown

Lecture:	Topics	Course Weight	Date/Time
MT	Integument, Bones	30%	October 23rd, 2020 (6:00-7:30 pm)
Final	Bones, Muscles, Joints	30%	TBA
Lab:			
Lab Exam 1	Integument, Bones, Joints	20%	October 9 th , 2020 (6:00-7:30 pm)
Lab Exam 2	Muscles (and bones)	20%	November 27 th , 2020 (6:00-7:30 pm)
Assignments:			
Assignment 1	Introduction Video	NIL (required)	September 27, 2020 (due 11:59 pm)
Assignment 2	MT Reflection	3% Bonus	November 8, 2020 (due 11:59 pm)

**Dates are subject to change

Course Description:

Anatomical systems/topics covered are the integumentary, muscular, and skeletal systems as well as arthrology.

Lecture and Lab Examinations:

There is one midterm (MT) and a final exam and two Lab exams. Both the MT and final exams will consist of a variety of questions types such as fill-in-the-blank (FITB), T/F, MCQ, matching, short answer, etc.). These exams will be out of 100-200 marks each. The length of exams will be dependent of the number of questions and as well as the type of questions. These exams will assess you on the information covered within the recorded lectures or any **ASSIGNED** readings from the textbook.

Ninety (90) minutes and three (3) hours will be allotted for the exams, respectively. The exams may not take the full time, however, you should set that time aside in your schedules/calendars. The final exam will assess the information covered from the MT on.

There are two lab exams and will include approximately 25-50 questions. Each question will consist of an image and there will be multiple structures that you will have to identify. You will be tested on bones, models, radiological, and histological materials. Given that the labs are “online”, images of the material from the lab will be provided (D2L) and the on-line lab exam will be based **LARGELY BUT NOT SOLELY** on those images.

If you cannot write an exam on the scheduled day/time, then please contact me in advance via email (donna.newhouse@lakeheadu.ca)

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

Assignment 1: Introduction Video

You will be required to upload an introduction video of yourself to the D2L site. This will allow me an opportunity to “meet” you virtually and get to know a little bit about you which is particularly important given that we, regrettably do not have any formal face to face interactions during this course. Please include anything you would like to share about yourself. You could include such information as your career aspirations, where you are from, whether you have siblings and/or pets, play sports, have any hobbies, or volunteer, summer employment, etc.

Assignment 2: MT Reflection

Some background reading on this is provided under “Reflective Learning” on the Biol 2011 D2L site. For this assignment, I would like you to critically reflect on how you did on the midterm exam. The objective of this assignment is that it may improve your ability to analyze how you learn (i.e. metacognitive abilities) which may lead to lessons learned on how best to prepare for subsequent exams.

As this is just a 3% bonus assignment, my expectations are for a one page, single spaced, typed submission. Remember, as noted in the posted article, that a good critical reflection includes "(1) linking past, present, and future experience; (2) integrating cognitive and emotional experience; (3) considering the experience from multiple perspectives; (4) reframing; (5) stating the lessons learned; and (6) planning for future learning or behaviour."

Course and University Policies

The policies set out below are for the students' benefit. These policies are set forth to ensure that all students are treated fairly. Please read thoroughly.

Behavioral standards:

Please refer to the [Student Code of Conduct - Academic Integrity](#).

Netiquette:

Please communicate with me via your Lakehead e-mail account. It is appropriate to address me as Donna or Professor Newhouse. Always use **Biology 2011 FDE 2020 in the subject line** of any email you send to me. I will respond to all e-mails in a timely fashion (usually within 24 hours, with the exception of weekends). If you would like to arrange to meet via a Zoom call for purposes of office hours, I am happy to do so, but I would ask that students contact me in advance, so that we can agree to meet at a mutually convenient date/time.

Academic Integrity Statement:

I understand and agree that:

(1) Unless otherwise allowed by the course instructor, I must complete the assignments in this course without the assistance of anyone else.

(2) Unless otherwise allowed by the course instructor, I must not access any sources or materials (in print, online, or in any other way) to complete any course exam.

I further understand and agree that, if I violate either of these two rules, or if I provide any false or misleading information about my completion of course assignments or exams, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University's academic values.

Copyright:

All instructional, reference, and administrative materials prepared for this course are protected in their entirety by copyright. Students are expected to comply with

this copyright by only accessing and using the course materials for personal educational use related to the course, and that the materials cannot be shared in any way, without the written authorization of the course instructor. If this copyright is infringed in anyway, students may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University’s academic values.

Copyright Compliance:

I understand and agree that all instructional, reference, and administrative materials to which I am given access in this course (the "course materials"), whether they consist of text, still or kinetic images, or sound, whether they are in digital or hard copy formats, and in whatever media they are offered, are protected in their entirety by copyright, and that to comply with this copyright and the law

(1) I may access and download the course materials only for my own personal and non-commercial use for this course; and

(2) I am not permitted to download, copy, or store (in any medium) any text, image, or sound component of the course materials for any other purpose whatsoever, or to forward or share, transmit, broadcast, show, post or play in public, adapt, or change in any way any text, image, or sound component of the course materials, except as expressly authorized, and only to the extent authorized, in writing, by the course instructor."

I further understand and agree that, if I infringe the copyright of the course materials in any way, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University’s academic values.

Regulations

It is the responsibility of each student registered at Lakehead University to be familiar with, and comply with all the terms, requirements, regulations, policies and conditions in the Lakehead University [Academic Calendar](#). This includes, but is not limited to, Academic Program Requirements, Academic Schedule of Dates, University and Faculty/School Policies and Regulations and the Fees and Refund Policies and Schedules (Lakehead University Regulations webpage, 2020-21).

Academic Integrity

A breach of Academic Integrity is a serious offence. The principle of Academic Integrity, particularly of doing one’s own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should view the [Student Code of Conduct - Academic Integrity](#) for a full description of academic offences, procedures when Academic

Integrity breaches are suspected and sanctions for breaches of Academic Integrity.

Supports for Students – there are many resources available to support students. These include but are not limited to:

- [Health and Wellness](#)
- [Student Success Centre](#)
- [Student Accessibility Centre](#)
- [Library](#)
- [Lakehead International](#)
- [Indigenous Initiatives](#)

Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities and/or medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please contact [Student Accessibility Services](#) (SC0003, 343-8047 or sas@lakeheadu.ca)

LABORATORY SCHEDULE 2020

BLOCK 1:

September 9 - October 4

Integument, Bones and Joints

October 9

LAB EXAM #1

BLOCK 2:

October 21 - November 22

Muscles (and some bones)

November 27

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. Tissues and Tissue Types

- A. Tissue Types
 - (1) epithelial
 - (2) connective
 - (3) muscular
 - (4) nervous

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

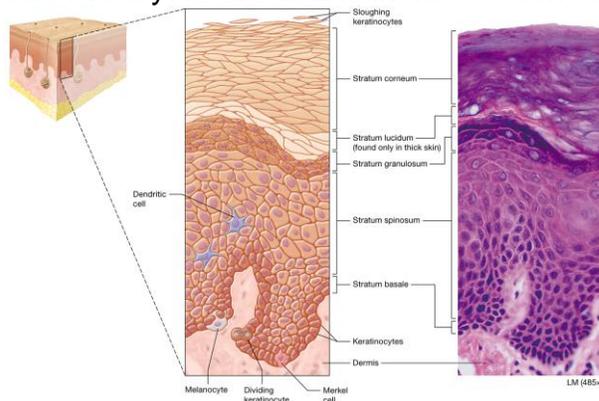
LABORATORY OUTLINE SKELETAL SYSTEM AND JOINTS

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/images:

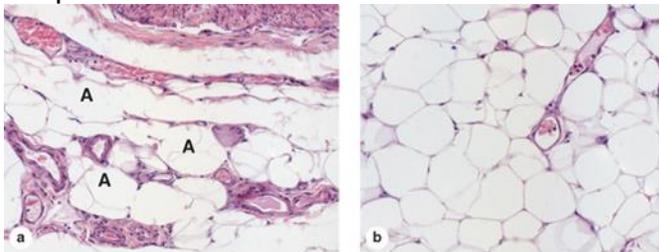
Slide 1: Integument.

The five layers are visible in this section of thick skin.



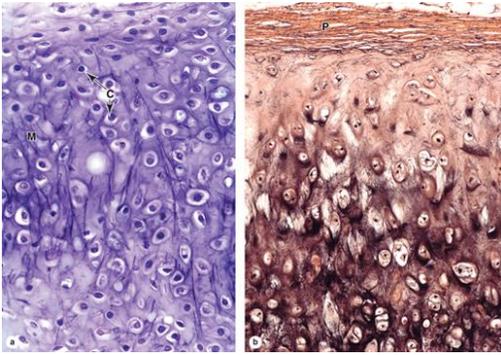
Slide 2: Adipose connective tissue.

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.

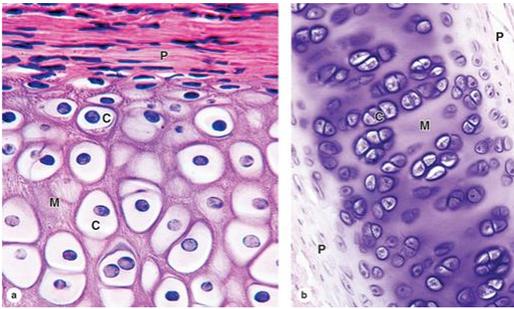


Slide 3: Elastic cartilage.

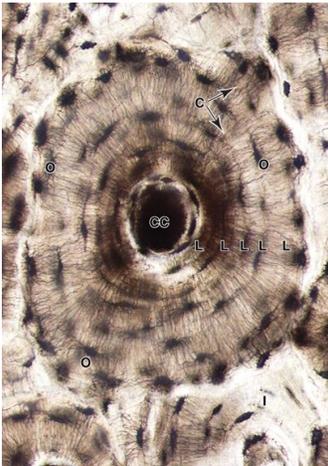
The cartilage is the broad band of pale purple. The matrix itself stains pale purple and within it are spaces called lacunae. Within the spaces are the cartilage cells - the chondrocytes. The elastic fibres are the fine strands running through the matrix.



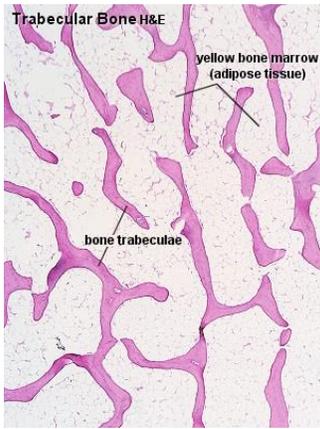
Slide 4: Hyaline cartilage. On this slide, the cartilage is the area of lacunae (stained purple). It has the chondrocytes just as elastic cartilage does but there are no elastic fibres.



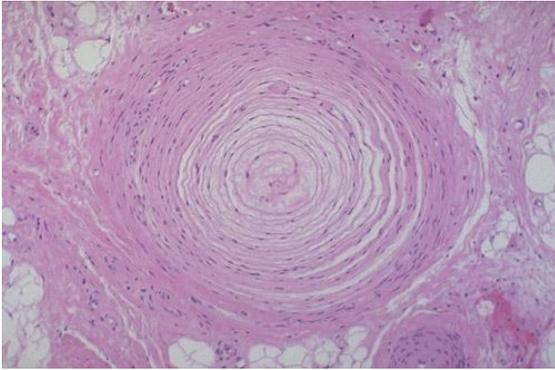
Slide 5: Compact bone. The characteristic of this slide is the Haversian system that is found only in compact bone. Although they are not visible, the osteocytes are in the lacunae.



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 within the dermis. They have the appearance of the cut surface of an onion.



Integument

Epidermiss	Stratum spinosum	Stratum granulosum
Stratum basale	Stratum corneum	Dermis
Stratum lucidum	Stratum reticularosum	
Stratum papillarosum	Dermal papillae	Arrector pili m.
Pore	Sweat gland	Sweat gland duct
Sebaceous gland	Cutaneous blood vessels	Pacinian corpuscles
Hair root	Hair follicle receptor	Hair follicle
Hair medulla	Hair shaft	Hair papilla
Hair cortex	Henle's layer	Inner root sheath
Huxley's layer	Free nerve ending	Ruffini corpuscle
Outer root sheath	Meissner's corpuscle	Hypodermis
Krause's end bulb		
Adipose tissue		

Axial Skeleton

Skull - Cranium

Frontal bone:

Frontal sinus	Supraorbital ridge	Supraorbital foramen
Coronal suture		

Parietal bone:

Squamous suture	Lambdoidal suture	Sagittal suture
Grooves of middle meningeal aa.		

Temporal bone:

Mastoid process	Mandibular fossa	Zygomatic process
Stylomastoid foramen	Styloid process	Petrous portion
Squamous portion	External acoustic meatus	Internal acoustic meatus

Occipital bone:

Foramen magnum	Occipital condyles	Jugular foramen
Hypoglossal foramen	Groove of transverse sinus	Groove of sigmoid sinus

Sphenoid bone:

Sphenoid sinus	Foramen ovale	Foramen rotundum
Foramen spinosum	Optic foramen	Superior orbital fissure
Inferior orbital fissure	Sella turcica	

Ethmoid bone:

Crista galli	Cribriform foramina	Cribriform plate
Perpendicular plate	Superior nasal concha	Middle nasal concha

Axial Skeleton
Skull – Facial Bones

Maxilla:

Maxillary sinuses	Palatine process	Alveolar process
Infraorbital foramen		

Mandible:

Condylar process	Coronoid process	Ramus
Alveolar border	Angle	Mental foramen
Mandibular foramen	Lingula	Body
Mental symphysis		

Nasal bones

Lacrimal bones

Inferior nasal conchae

Zygomatic bones

Vomer bone

Palatine bones

Malleus (ear ossicle)

Incus (ear ossicle)

Stapes (ear ossicle)

Hyoid bone:

Greater horn	Lesser horn	body
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Vertebrae: Typical

Body	Pedicle	Lamina
Superior articular process	Inferior articular process	Transverse process
Spinous process	Transverse foramen (C)	Costal facets (T)

Vertebrae: Atypical

Anterior arch (C1)	Posterior arch (C1)	Odontoid process (C2)
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Sacrum:

Ala	Body	Sacral foramina
Cornu	hiatus	

Coccyx

Ribs:

Head	Neck	Tubercle
Costal groove		

Sternum:

Jugular notch	Manubrium	Sternal angle
Body	Xiphoid process	

Appendicular Skeleton Pectoral Girdle

Scapula:

Vertebral (medial) border	Axillary (lateral) border	Superior angle
Inferior angle	Spine	Acromion
Glenoid fossa	Coracoid process	Supraspinous fossa
Infraspinous fossa	Subscapular fossa	

Clavicle:

Sternal (medial) end	Acromial (lateral) end	Conoid tubercle
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Appendicular Skeleton Upper Extremity

Humerus:

Head	Deltoid tuberosity	Capitulum
Coronoid fossa	Olecranon fossa	Trochlea
Medial epicondyle	Lateral epicondyle	Supracondylar ridges
Intertubercular groove	Greater tubercle	Lesser tubercle

Ulna:

Trochlear notch	Olecranon process	Coronoid process
Radial notch	Head	Styloid process

Radius:

Head	Radial tuberosity	Neck
Styloid process		

Carpal bones:

Scaphoid	Lunate	Trapezium
Capitate	Triquetral (triquetrum)	Pisiform
Trapezoid	Hamate (hook of hamate)	

Metacarpal bones:

Metacarpal I	Metacarpal II	Metacarpal III
Metacarpal IV	Metacarpal V	

Phalanges:

Proximal phalanx	Middle phalanx	Distal phalanx
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Appendicular Skeleton

Pelvic Girdle

Os Coxae:

Pubis symphysis	Acetabulum	Obturator foramen
Greater sciatic notch	Lesser sciatic notch	Ischial spine
Anterior superior iliac spine	Ischial tuberosity	Pubis
Anterior inferior iliac spine	Ischium	Ilium
Posterior superior iliac spine		
Posterior inferior iliac spine		

Appendicular Skeleton

Lower Extremity

Femur:

Head	Neck	Greater trochanter
Lesser trochanter	Linea aspera	Medial condyle
Lateral condyle	Intercondylar fossa	

Patella:

Base	Apex
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Tibia:

Lateral condyle	Medial condyle	Medial malleolus
Tibial tuberosity	Nutrient foramen	Intercondylar eminence

Fibula:

Head	Neck	Lateral malleolus
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Tarsal Bones:

Talus	Calcaneus	Navicular
Cuboid	Medial (1 st) cuneiform	
Intermediate (2 nd) cuneiform	Lateral (3 rd) cuneiform	

Phalanges:

Distal phalanx	Middle phalanx	Proximal phalanx
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Model of Bone:

Periosteum	Lamellae - interstitial	Lamellae - concentric
Osteocyte	Canaliculi	Osteon
Central canal	lacuna	Perforating fibres
Perforating canals		

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

Appendicular Skeleton

Joints

Knee:

Anterior cruciate ligament	Medial meniscus	Lateral meniscus
Posterior cruciate ligament	Quadriceps tendon	Patellar ligament
Medial collateral ligament	Lateral collateral ligament	
Posterior menisofemoral ligament		

Shoulder:

Acromioclavicular ligament	Coracoacromial ligament	Coracohumeral ligament
Superior transverse scapular ligament	Tendon - Long head of biceps brachii m.	Transverse humeral retinaculum
Coracoclavicular ligament	Conoid ligament	Trapezoid ligament

Elbow:

Medial collateral ligament	Lateral collateral ligament	Annular ligament
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Hip:

Iliofemoral ligament	Ischiofemoral ligament	Pubofemoral ligament
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MUSCULAR SYSTEM

This section lists the muscles you need to know for 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.

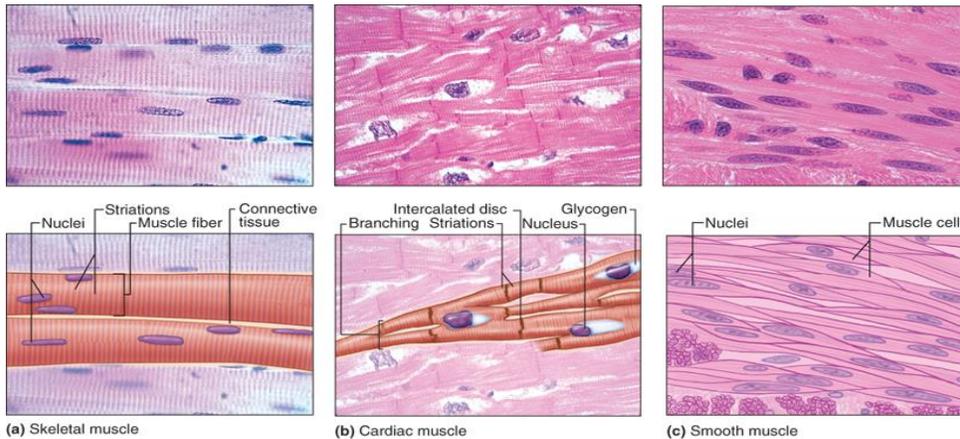
Histology:

You are responsible for the microscopic anatomy of the three types of muscles. The three types of muscle are available shown in images below

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.

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

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).

Muscles of the Head/Neck Region

Head:

Masseter	Temporalis	Buccinator
Orbicularis oris	Orbicularis oculi	Frontalis
Occipitalis	Zygomaticus major	Zygomaticus minor

Neck:

Platysma	Sternocleidomastoid	sternohyoid
Sternothyroid	Thyrohyoid	stylohyoid
Anterior scalene	Middle scalene	Posterior scalene
Levator scapula		

Muscles of the Thorax/Abdomen/Back

Thorax:

Pectoralis minor	Pectoralis major	Serratus anterior
External intercostal	Internal intercostal	

Abdomen:

Internal abdominal oblique	Transversus abdominis	Rectus abdominis
External abdominal oblique		

Back:

Latissimus dorsi	Rhomboideus major	Rhomboideus minor
Erector spinae	Trapezius	Quadratus lumborum

Muscles of the Upper Extremity

Teres minor	Teres major
Supraspinatus	Infraspinatus
Subscapularis	Deltoid
Biceps brachii – long head	Biceps brachii – short head
Coracobrachialis	Brachialis
Pronator teres	Flexor carpi radialis
Palmaris longus	Flexor carpi ulnaris
Flexor digitorum superficialis	Flexor digitorum profundus
Flexor pollicis longus	Pronator quadratus
Triceps brachii – long head	Triceps brachii – lateral head
Triceps brachii – medial head	Brachioradialis
Extensor carpi radialis longus	Extensor carpi radialis brevis
Extensor digitorum	Extensor carpi ulnaris
Abductor pollicis	Extensor pollicis brevis
Extensor pollicis longus	Flexor pollicis brevis
Abductor pollicis brevis	Opponens pollicis
Adductor pollicis	Flexor digiti minimi
Abductor digiti minimi	Opponens digiti minimi
Supinator	lumbricals

Muscles of the Lower Extremity

Psoas major

Iliacus

Tensor fasciae latae (Iliotibial band)

Rectus femoris

Vastus medialis

Pectineus

Adductor brevis

Gracilis

Gluteus medius

Piriformis

Inferior gemellus

Obturator externus

Semitendinosus

Biceps femoris – long head

Tibialis anterior

Extensor digitorum

Fibularis (peroneus) brevis

Soleus

Popliteus

Flexor hallucis longus

Psoas minor

Iliopsoas

Sartorius

Vastus lateralis

Vastus intermedius

Adductor longus

Adductor magnus

Gluteus maximus

Gluteus minimus

Superior gemellus

Obturator internus

Quadratus femoris

Semimembranosus

Biceps femoris – short head

Extensor hallucis longus

Fibularis (peroneus) longus

Gastrocnemius

Plantaris

Tibialis posterior

Flexor digitorum longus