BIOLOGY 2012
INTERNAL ANATOMY
2022

COURSE SYLLABUS/LAB MANUAL

BIOLOGY 2012
INTERNAL ANATOMY

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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	Nervous System CVS Part 1 (Blood) CVS Part 2 (Heart)	30%	Feb 11, 2022 (7:00 pm)
Final	CVS Part 3 & 4 All remaining systems	40%	TBA
Lab:			
Lab Exam	All systems	30%	*If LU returns to in-person delivery of LABS, then the dates are as follows:* LAB W1 & W3 March 29, 2022 (7:00 pm EST) LAB WD5 (online) March 29, 2022 (7:00 pm EST) LAB W2 & W4 March 30, 2022 (7:00 pm EST) ***If LU determines that delivery will be online for entire term then Lab Exam will be written online by all students enrolled in W1, W2, W3, W4, and WD5 on:* April 1, 2022 (7:00 pm EST)

General Information: Lectures
Since the lecture portion of this course is asynchronous I strongly encourage students to review their timetables and find a minimum of 2 x 1.5 hours (or 1 x 3.0 hours) timeslots in your schedule and review the recorded lectures as if you were attending an on campus lecture or zoom. For example, on Monday/Wednesday from 4:00-5:30 (or any other time your schedule permits) review a lecture, and every Wednesday from 7:00-10:00pm review lab material.

General Information: Lecture Examinations
There are a total of two lecture (MT & Final) and one laboratory examinations. The two lecture exams will consist of a variety of questions (mostly fill-in-the-blank type [FITB-Identify, Greek & Latin], T/F, MCQ, Multi-select (MS), Briefly Explain). The MT and Final exams will be approximately 125-200 marks. The allotment of time for these exams is based on the Teaching Commons guidelines of time/type of question. For example, 1 minute is alloted for each MCQ and Multi-select (MS) questions, 15 seconds per True/False questions, 30 seconds per FITB (Identify, Greek & Latin) questions, etc. There will be a strict time limit for both exams and the exact duration of the exams will be announced a few days prior to the scheduled exams.

The midterm will cover all Nervous System lectures and Cardiovascular System Part 1 & 2 – Blood & Heart. The final exam will cover the Cardiovascular System Part 3 & 4 and the remaining systems***. The final exam is not cumulative.***

The majority of questions on the MT and Final Exams are derived from content covered in the lectures.

General Information: LABs
In-person and online LABs are generally self-directed labs. Students are responsible for identifying all the structures listed in the lab manual on either models or on the images provided under lab content on D2L site.

Students enrolled in LAB sections W1 & W3 (Tues) and W2 & W4 (Wed), will attend in-person labs (hopefully by end of January, if not sooner). In the meantime, students can review the lab images on the D2L site. If LU does not return to in-person labs, then all students will be required to learn lab content online.

Students enroled in LAB section WD5 are responsible for identifying all the structures listed in the lab manual on images provided under lab content on D2L site.

The GA's will schedule LAB drop-in for students to ask clarifying questions related to the lab content. Students are encouraged to label the structures on the images and can review the labeled structures with GA during these drop-ins. These drop-in sessions are not mandatory.

I strongly encourage students to review their timetables and identify a 1 x 3.0 hours (or 2 x 1.5 hours) timeslot and work through the lab content.

General Information: Laboratory Examination
If LU returns to in-person (LABS) then students enrolled in the in-person labs (LAB W1, W2, W3, W4) will write the lab exam in-person during their scheduled lab. Those students who have enrolled in LAB WD5 will write the lab exam online at the scheduled time. If however, LU continues with online delivery for duration of the course, then all students will write the lab exam online (as noted on above/previous page).

The lab material will be images of models, images of cadaveric specimens, etc. The lab exam will require one to "identify structure labeled A, B, C, etc". Students will be alloted 30 seconds per question. There will be a strict exam time limit. *Ensure that you are spending appropriate amounts of time reviewing the lab content throughout the term and do not leave it until the last week to prepare for the lab exam.*

Online Examinations:
Please note that it is very important to ensure you have a good internet connection and a fairly fast internet download speed, particularly for the online exams.

If there are any issues during the online exams (connectivity, etc.) and students feel that their performance was negatively affected, you will be required to take an oral exam (online via Zoom) within two days of the scheduled exam.

Lakehead University takes Academic Integrity VERY SERIOUSLY.

Please note the following regarding ONLINE exams:

1. Treat online exams with the same integrity as you would in-person exams.
    a. You are not permitted to use any resources during this exam (i.e., class notes, textbooks, apps, smart phones, internet search engines, spellcheckers, etc.).
    b. You are not permitted to collaborate or communicate with anyone during this exam (group texts, etc.).
    c. Close all open tabs, except for the D2L tab and programs running in background.
2. Using websites such as Chegg is a breach of academic integrity and is very risky during an exam.
    a. Students have been blackmailed and financially exploited after using hired services on websites.
3. There is to be NO reproduction or dissemination of the content of the exam.
    a. No screen shots (computer or photos of content)
    b. No writing down of questions
    c. See 2.a. above.
4. Academic expectations outlined in the Student Code of Conduct.

a. Lakehead's Academic Integrity Code clearly states that unauthorized collaboration or accessing prohibited materials during examinations is not permitted. Academic penalties for cheating on an exam could include a zero on an exam or a failure in the course with 'academic misconduct' noted on the student's transcript. The risk to a student's academic success is very high.

Since the lecture portion of this course is asynchronous (and there is potential that the lab portion may also be asynchronous if LU does not return to in-person delivery), I strongly encourage students to review their timetables and find 2 x 1.5 hours and 1 x 3.0 hours timeslots in your schedule and review the recorded lectures as if you were attending an on campus lecture or zoom. For example, on Monday/Wednesday from 4:00-5:30 (or any other time your schedule permits) to review a lecture, and every Wednesday from 7:00-10:00pm review lab material.

I welcome you to Biology 2012 (2022) 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 2012 - 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. Exams will not be returned, however, if requested, I will review a students exam and provide feedback on their performance.

2. If there are any issues during the online exams (connectivity, etc.) and students feel that their performance was negatively affected, you will be required to take an oral exam (online via Zoom) within two days of the scheduled exam.

3. All exams for this course are CLOSED BOOK, therefore you cannot consult your notes, textbook, internet, or any resource of any description (including another student) while writing an exam.

4. In the event that a student has to miss a lab or lecture exam for emergency or medical reasons, it will be the student's responsibility to get in touch with Donna Newhouse [(807) 474-9016] prior to the scheduled exam. Failure to comply will result in a grade of zero for the exam.

5. Images provided are not to be copied or redistributed for any purposes.

6. 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 (...Doug Ford...Justin Trudeau!!!). 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!)

LECTURE OUTLINE
(Subject to Change)

I. Nervous System
- A. Organization
- (1) anatomical classification
  - (a) central nervous system
  - (b) peripheral nervous system
- (2) functional classification
  - (a) cerebrospinal fluid
  - (b) autonomic system

- B. Gross anatomy
- (1) central nervous system
  - (a) meninges
  - (b) major regions of the brain
  - (c) spinal cord
- (2) peripheral nervous system
  - (a) cranial nerves
  - (b) spinal nerves
- (3) autonomic nervous system
  - (a) sympathetic division
  - (b) parasympathetic division

II. Respiration
- A. General comments
- B. Nose
- C. Sinuses of skull
- D. Pharynx
- E. Larynx
  - (1) location and function
  - (2) cartilages
  - (3) vocal cords
  - (4) muscles
- F. Trachea
- G. Bronchial tree
- H. Lungs
- I. Muscles and nerves involved in breathing

III. Circulatory System
- A. Microscopic anatomy (vascular connective tissue)
  - (1) plasma
  - (2) formed elements (erythrocytes, leukocytes, thrombocytes)
- B. General functions
  - (1) transportation
  - (2) protection
  - (3) maintenance of homeostasis

C. Heart
(1) pericardium
(2) layers of the heart (epicardium, myocardium, endocardium)
(3) chambers and valves
(4) 'neuromuscular' tissue
(5) nerve supply to the heart
D. Arterial blood vessels
(1) aorta
(2) arteries of the head and neck
(3) arteries of upper limb
(4) arteries of abdomen
(5) arteries of lower limb
E. Venous blood vessels
(1) veins of head and neck
(2) veins of thorax
(3) veins of upper limb (deep and superficial)
(4) veins of lower limb (deep and superficial)
(5) veins of the pelvis and abdomen (hepatic portal system)
F. Fetal circulation
G. Lymphatic System
(1) lymph system
(2) lymph nodes

IV. Digestion
A. Functions
B. General review of structures involved
C. Mouth
(1) salivary glands
(2) teeth
(3) muscles of mastication
D. Pharynx
E. Esophagus
F. Stomach
G. Liver
H. Pancreas
I. Small intestine
J. Large intestine
K. Rectum, anus

V. Urinary System
A. Functions
B. Kidney
(1) gross anatomy
(2) microscopic anatomy
C. Ureter
D. Bladder
E. Urethra

VI. Reproductive System
- A. General comments
- B. Male reproductive structures
  - (1) scrotum
  - (2) testes (enclosing capsule, seminiferous tubules)
  - (3) epididymis
  - (4) vas deferens
  - (5) seminal vesicles
  - (6) prostate gland
  - (7) Cowper's glands
  - (8) urethra
  - (9) penis
- C. Female reproductive structures
  - (1) ovaries
  - (2) fallopian tubes
  - (3) uterus
  - (4) vagina
  - (5) external structures

VII. Special Sensory Structures
- A. Nerve endings in skin
- B. Olfactory sense
- C. Taste receptors
- D. Structure of the eye
  - (1) orbit
  - (2) eyelids
  - (3) lacrimal apparatus
  - (4) extrinsic muscles
  - (5) internal structure
- E. Structure of the ear
  - (1) external ear
  - (2) middle ear
  - (3) inner ear

VIII. Endocrine System
- A. General functions (comparison with nervous system)
- B. Location, specific function and anatomy of glands

THE CNS, PNS, INTERNAL ANATOMY and SPECIAL SENSES

Students are responsible to know all the structures listed on pages 11-16 for the LAB EXAM.

The Nervous System:

1. Twelve cranial nerves

2. Cerebrum: frontal lobe, parietal lobe, temporal lobe, occipital lobe, longitudinal cerebral fissure, central sulcus

corpus callosum: genu, body, splenium, anterior commissure, intermediate commissure (interthalamic adhesion), posterior commissure
thalamus
hypothalamus
choroid plexus
pineal gland (body)
optic chiasm
pituitary gland: infundibulum
mammillary body

3. Cerebellum: arbor vitae

4. Brainstem: medulla oblongata, pons, midbrain (cerebral peduncle)

5. Spinal cord
gray matter: ventral (anterior) horn, lateral horn, dorsal (posterior) horn, commissure
white matter
anterior white commissure
ventral median fissure
dorsal median sulcus
central canal
epidural space (fat in epidural space)
dura mater
arachnoid mater
subarachnoid space
pia mater
ventral root
dorsal root
spinal ganglion (dorsal root ganglion)
ventral ramus
dorsal ramus
spinal nerve

sympathetic trunk
rami communicans (gray and white)
denticulate ligament
ligamentum flavum

vertebral artery/vein
superficial peroneal n
deep peroneal n.
common peroneal n.
saphenous n.
sciatic n.
tibial n. (posterior tibial n.)
iliohypogastric n.
femoral n.
obturator n.
intercostal nn.
phrenic n.
axillary n.
median n.
ulnar n.
radial n.
musculocutaneous n.

cervical plexus
brachial plexus
lumbar plexus
sacral plexus

mental n.
infraorbital n.
supraorbital n.
facial n.

INTERNAL ANATOMY
Digestive, Respiratory, Urinary, Reproductive and Cardiovascular Systems and Special Senses

Internal Anatomy: Models
You are responsible for all of the visceral organs found in the body. You should familiarize yourself with structures specific to certain viscera.

Structures of the male sexual organ:

prepuce	external anal sphincter (m)	internal anal sphincter
cremaster m.	urinary bladder	rectus abdominis m.
rectum	ureter	prostatic urethra
urethra	prostate gland	spermatic cord
seminal vesicle	ductus (vas) deferens	testis
scrotum	corpus spongiosum	external urethral sphincter
epididymis	corpus cavernosum	
penis	pampiniform venous plexus	
glans penis		

Structures of the female sexual organ:

ureter	external anal sphincter	internal anal sphincter
urethra	rectus abdominis m.	rectum
labium majora	labium minora	clitoris
round ligament	ovarian ligament (proper)	fallopian tube
broad ligament	ovary	vagina
uterus	cervix	fornix of vagina
urinary bladder		

Structures of the kidney:

renal a/v.	arcuate a/v.	medulla
cortex	renal pyramid	renal papilla
renal pelvis	major calyces	minor calyces
ureter	loop of Henle	interlobular a/v.
interlobar a/v.		afferent arteriole
efferent arteriole		glomerulus

Structures of the liver:

right lobe	left lobe	caudate lobe
quadrate lobe	falciform ligament	gallbladder

Structures of the Intestines:

duodenum	jejunum	ileum	rectum
cecum	appendix	ileocecal valve	
ascending colon	transverse colon	descending colon	
haustra	greater omentum	right (hepatic) colic flexure	
epiploic appendices	sigmoid colon	left (splenic) colic flexure	

Structures of the Larynx:

Hyoid, thyroid cartilage, cricoid cartilage, arytenoid cartilage, corniculate (Santorini) cartilage, cuneiform (Wrisberg's) cartilage, tracheal cartilages epiglottis

Structures of the lung:

superior lobe	middle lobe	inferior lobe
oblique fissure	horizontal fissure	lingula of lung
apex	cardiac notch	hilus

Miscellaneous structures:

spleen, thymus gland, thyroid gland, adrenal glands, inguinal ligament

THE CIRCULATORY SYSTEM

Structures of the **Human Heart** (that you are responsible for):

atrium
auricle
ventricle
apex
base
superior vena cava
inferior vena cava
ascending aorta
arch of aorta
thoracic aorta
abdominal aorta
brachiocephalic trunk
L/R common carotid a.
L/R subclavian a.
ligamentum arteriosum
R. coronary a.
L. coronary a.
posterior interventricular a.
anterior interventricular a.
circumflex a.
great cardiac v.
coronary sinus
pulmonary trunk
pulmonary vv.
brachiocephalic vv.
fossa ovalis (remnants)
tricuspid valve
bicuspid (mitral) valve
semilunar valve of pulmonary a.
semilunar valve of aorta
papillary mm.
chordae tendineae
trabeculae carnae
pectinate m.
moderator band
trachea
pulmonary aa.
bifurcation of trachea (carina)
right bronchus
left bronchus
middle cardiac v.

Vessels of the lower extremities:

Common iliac a.
external iliac a/v.
internal iliac a/v.
obturator a.
superior gluteal a.
inferior gluteal a.
internal pudendal a.
femoral a/v.
deep femoral a. (profundus)
popliteal a.
posterior tibial a.
anterior tibial a.
dorsalis pedis a.
greater saphenous v.
lesser saphenous v.

Vessels of the upper extremities:

axillary a.
brachial a.
radial a.
ulnar a.
anterior humeral circumflex a.
superficial palmar br. of ulnar a.
superficial palmar br. of radial a.
princeps pollicis a.
common palmar digital aa.
proper palmar digital aa.
superficial palmar arch

Vessels of the head and neck:

superficial temporal a.
maxillary a.
common carotid a.
subclavian a.
internal carotid a.
external carotid a.
internal jugular v.
external jugular v.

Vessels of the abdomen:

left gastric a.
superior mesenteric a/v.
inferior mesenteric a/v.
celiac trunk
hepatic a/v.
splenic a/v.
abdominal aorta
renal a/v.
testicular (ovarian) a/v.
common iliac a/v.

SENSORY STRUCTURES

Structures of the eye:

sclera	cornea	retina
choroid	iris	lens
pupil	vitreous humor	optic papilla
macula	fovea centralis	retinal vv.
retinal aa.	superior oblique m.	inferior oblique m.
lateral rectus m.	medial rectus m.	superior rectus m.
inferior rectus m.	lacrimal gland	optic nerve

Structures of the ear:

auricle	oval (vestibular) window
external acoustic meatus	round (cochlear) window
tympanic membrane	lateral semicircular canal
malleus (a) head (b) neck (c) manubrium	
incus (body, short crus, long crus, lenticular process of incus)	
stapes (head, anterior crus, posterior crus, base	
posterior semicircular canal	cochlea
vestibulocochlear n. (CN VIII)	internal acoustic meatus
anterior (superior) semicircular canal	tensor tympani m.