

**BIOLOGY 2012
INTERNAL ANATOMY
2026**

COURSE SYLLABUS/LAB MANUAL



BIOLOGY 2012
INTERNAL ANATOMY

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GA's & TA's: Olivia Hicklin (GA)
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Required Texts: Principles of Human Anatomy (15e)
Author: Tortora & Nielsen (2019)
(\$236.95; previous editions are acceptable)

Atlas of Human Anatomy (8e)
Author: Netter (2019)
(\$119.99; previous editions are acceptable)

Lectures: T/TH RC-0005 5:30-7:00 pm
Labs: Tuesday or Wednesday CB 3013 & 3015 7:00-10:00 pm

Mark Breakdown

Lecture:	Topics	Course Weight	Date/Time
MT	CNS, PNS Internal Anatomy	30%	Feb 10, 2026 (5:30 pm)
Final	Jan-April with emphasis on material covered from MT onward	40%	TBA
Lab:			
Lab Exam	All systems	30%	Mar 17 & 18, 2026 (7:00 pm)

General Information: Lecture and Laboratory Examinations

There are a total of two lecture and two laboratory quizzes/tests/examinations. The two lecture quizzes will consist of a variety of questions (mostly fill-in-the-blank type, T/F, MCQ). The lecture test will be written during class time and will be worth approximately 100-125 marks. The Final exam will be primarily fill-in-the-blank, short answer, clinical corner, and will consist of approximately 150-300 marks. Eighty (80) minutes and three (3) hours will be allotted for the quiz and the exam, respectively. The final exam will cover information from January through April, **but the majority of information covered will be from the midterm onward.**

There will be one lab exam 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! You will be tested on models, radiological, and histological materials.

All lab and lecture quizzes/tests/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 (and Biol 2011) 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 2012 and hope that your experience in this course 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. 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 EXCEPT for the week before the Lab exams.

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

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 2012 WA 2026** 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).

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).

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 mental n.

brachial plexus infraorbital n.

lumbar plexus supraorbital n.

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

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.