

BIOLOGY 2012
INTERNAL ANATOMY
(“Where one has to work their phalanges to the periosteum!”)
2016

LAB MANUAL



BIOLOGY 2012
INTERNAL ANATOMY

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

Atlas of Human Anatomy (4e.).
 Author: Netter (2010)

Mark Breakdown:

Lecture:	2 exams:	1. Midterm Exam: CNS, PNS, Internal Anatomy (February 10th) [20%] 2. Final Exam: Material covered from January-April (TBA) [40%]
Lab:	2 exam:	1. Cat Muscles, CNS, PNS (Feb. 23,24) [20%] 2. Internal Anatomy, Circulatory System, and Sensory Structures (Mar 29, 30) [20%]

**Dates are subject to change

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 two lab tests 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, cats, 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 test component.

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. 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 2016

BLOCK 1:

January 12 - February 10

Muscles (Catavers), CNS, and PNS

February 23, 24

LAB EAM #1

BLOCK 2:

March 1 – March 23

Internal Anatomy, Circulatory System and Sensory Structures

Mar 29, 30

LAB EXAM #2

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 following is a list of muscles you should know in the **CATaver**:

Muscles of the Back

cutaneous maximus	clavodeltoid (clavobrachialis)
rhomboideus	rhomboideus capitis
spinothrapezius	supraspinatus
clavothrapezius	*infraspinatus
acromiorthrapezius	teres major
levator scapulae ventralis	teres minor
latissimus dorsi	splenius
spinodeltoid	serratus ventralis
acromiodeltoid	subscapularis

Muscles of the Chest and Abdomen

pectoantibrachialis	external oblique
pectoralis major	internal oblique
pectoralis minor	rectus abdominis
xiphohumeralis	transversus abdominis

Muscles of the Head and Neck

masseter	stylohyoid
sternomastoid	cleidomastoid
sternohyoid	sternothyroid
mylohyoid	thyrohyoid
digastric	stylohyoid

Muscles of the Chest and Arm

serratus ventralis	brachioradialis
subscapularis	extensor carpi radialis longus
biceps brachii	extensor digitorum communis
coracobrachialis	extensor carpi ulnaris
epitrochlearis	flexor carpi radialis
transversus costarum	pronator teres
scalenus	flexor carpi ulnaris
triceps (lateral, medial, long heads)	palmaris longus
brachialis	extensor carpi digitorum lateralis
anconeus	

Muscles of the Hip and Thigh

sartorius	pectineus
gracilis	adductor longus
vastus lateralis	semimembranosus
*vastus intermedius	semitendinosus
tensor fascia lata	tenuissimus
vastus medialis	gluteus maximus & medius
rectus femoris	caudofemoralis
iliopsoas	biceps femoris
	adductor femoris

Muscles of the Lower Leg

gastrocnemius
Achilles tendon
tibialis anterior
soleus

extensor digitorum longus
peroneus longus
flexor digitorum longus

THE CENTRAL AND PERIPHERAL NERVOUS SYSTEMS

You will be examining the central nervous system (CNS) via models of the human brain and the spinal cord. You are responsible for all parts identified in your lab manual.

The peripheral nervous system (PNS) will be learned via diagrams in your text and lab manual, plus the 'nerve man' model.

Histology: You are responsible for the following slides:

Slide 11: Nerve cells (neuron). The cell bodies are stained purple with a dark nucleus and many arms extending out. Most of these arms are dendrites that conduct impulses to the cell. There is one axon to pass on the signal. The axon is distinguished by the presence of a clear space in the cell body called an axon hillock at the point where the axon leaves the body. This clear area is devoid of the Nissl bodies that fill the rest of the cell body. You should know the difference between axons and dendrites, but you would not have to differentiate them on a slide.

Slide 12: Nerve (x.s. and l.s). A nerve is a closely packed group of nerve fibres enclosed in connective tissue. The purple "dots" in the middle of each circle are axons that make up the nerve fibres. The space around the axon used to be the myelin sheath before it was dissolved during processing of the slide. Note that around some of the spaces are the darkly stained nuclei of the Schwann cells that formed the myelin sheath.

Slide 13: Motor nerve ending, muscle. You will have to search along the length of the muscle fibres, but you will find nerve fibres that terminate in motor end plates on the muscle fibres. They look like black lines running across the fibres.

Slide 14: Human Spinal Cord. Look at this slide after you have seen the rat spinal cord (Slide 36). In the human slide, it may be more difficult to see the border between grey and white matter but neurons are still restricted to grey matter. Note that only the pia mater remains on the cord and some remnants of the arachnoid layer. Examining the diagrams in your text will help you to identify the areas. You are only expected to recognize a spinal cord in cross section, not longitudinal section.

Slide 15: Spinal cord (silver impregnation). The distinguishing feature is the presence of a butterfly shape in the center of the cord. This is the grey matter and is composed of neurons and nerve fibres. The white matter only has nerve fibres. The hole in the center is the central canal. The slit running towards the middle is the ventral median fissure. The covering of the cord is the pia mater, the space is the arachnoid space, then the arachnoid layer and finally the dura mater (the most external covering of the cord).

The Nervous System - Structures you are responsible to know

Twelve cranial nerves

CN I – Olfactory n.	CN VII – Facial n.
CNII – Optic n.	CN VIII – Vestibulocochlear n.
CN III – Oculomotor n.	CN IX – Glossopharyngeal n.
CN IV – Trochlear n.	CN X – Vagus n.
CN V – Trigeminal n.	CN XI – Accessory n.
CN VI – Abducens n.	CN XII – Hypoglossal n.

Cerebrum:

frontal lobe,	posterior commissure
parietal lobe,	thalamus
temporal lobe,	hypothalamus
occipital lobe,	choroid plexus
longitudinal cerebral fissure,	pineal gland (body)
central sulcus	optic chiasm
corpus callosum	pituitary gland: infundibulum
anterior commissure	mammillary body
intermediate commissure	

Cerebellum:

arbor vitae

Brainstem:

Medulla oblongata pons midbrain (cerebral peduncle)

Spinal cord gray matter:

ventral (anterior) horn,
lateral horn,
dorsal (posterior) horn,
commissure

Spinal cord/Spinal nerves

white matter	vertebral artery/vein
anterior white commissure	superficial peroneal n
ventral median fissure	deep peroneal n.
dorsal median sulcus	common peroneal n.
central canal	saphenous n.
epidural space (fat in epidural space)	sciatic n.
dura mater	posterior tibial n.
arachnoid mater	iliohypogastric n.
subarachnoid space	femoral n.
pia mater	obturator n.
ventral root	intercostal nn.
dorsal root	phrenic n.
spinal ganglion (dorsal root ganglion)	axillary n.
ventral ramus	median n.
dorsal ramus	ulnar n.
spinal nerve	radial n. musculocutaneous n.
sympathetic trunk	cervical plexus mental n.

rami communicans (gray and white)
denticulate ligament
ligamentum flavum

brachial plexus
lumbar plexus
sacral plexus

infraorbital n.
supraorbital n.
facial n.

INTERNAL ANATOMY

Digestive, Respiratory, Urinary, and Reproductive Systems

You are responsible for all the parts named in your lab manual - for both cat and human.

Notice that human organs may not be identical to those of the cat or sheep.

There is a model of the jaw for you to examine. Remember to learn the dental formula for the human, both deciduous and permanent teeth.

Regardless of the sex of your cat, you are responsible for knowing the structures for both male and female reproductive systems in both the cat and the human. Again, remember that there are differences between the cat and humans.

Histology: You are responsible for the following slides:

Slide 16: Intestine: duodenum, jejunum, ileum. All three sections of the small intestine exhibit folds called plicae circulares, villi projecting into the lumen of the intestine and goblet cells in the epithelium. The duodenum is characterized by the presence of duodenal glands in the submucosa. The ileum has patches of lymphocyte tissue called Peyer's patches. The jejunum has neither - it integrates between the duodenum and ileum.

Slide 17: Colon. Note the smooth appearance of the lumen caused by the lack of villi and the long tubular glands extending through the mucosa. The glands are lined with two types of cells in the columnar epithelium - goblet cells and absorbing cells.

Slide 18: Liver. Under low power, the section appears to be uniformly stained a light purple. The cells are arranged in cords that are grouped into lobules, although they may be hard to distinguish. Between the lobules, the interlobular space contains bile ducts and branches of the hepatic artery and/or hepatic portal vein.

Slide 19: Pancreas. Typically, sections through the pancreas look like they have separated into several pieces - these are the lobules. Within the lobules, the majority of cells form acini which consist of a circle of darkly stained cells around a lighter center. The irregularly shaped areas of lighter staining cells are the islets of Langerhans.

Slide 20: Lung. This tissue stains very lightly and appears to be a web of irregularly shaped and broken spaces. These spaces are the alveoli. Between them are long gaps called bronchioles. Larger bronchioles will be lined with ciliated columnar epithelium and be supported by cartilaginous rings. To avoid confusing this tissue with adipose tissue that also looks like "empty spaces", note that the borders of the alveoli are cells with nuclei, not just a cell membrane as in adipose cells.

Slide 21: Kidney. Typically, the outer fibrous capsule of this organ is covered in adipose tissue. The layer immediately internal to the capsule is the cortex. It is

distinguished by the presence of darkly stained circular areas called renal corpuscles. The inner part of the corpuscle is the glomerulus and it is enclosed by Bowman's capsule. Internal to the cortex is the medulla which is composed of tubules. Some slides may only have sections through the cortex so you should look at one with both areas to see the difference.

Slide 22: Ovary. All of the slides have at least one, if not more, large "holes" in them. These are mature Graafian follicles. Throughout the tissue are follicles in various stages of development and also the corpus luteum, corpus albicans and atretic follicles. You are not expected to be able to differentiate between them on a slide, but you should know what they are. The ovary itself is enclosed in epithelial tissue and just beneath this lining is the tunica albuginea.

Slide 23: Testis. Note the testes are composed of seminiferous tubules. If your slide is of a mature testis, you will be able to see the tails of sperm in the lumen of the tubules. Find the interstitial cells that are between the tubules and the tough fibrous outer coat called the tunica albuginea.

Slide 24: Sperm. Description will be provided in lab.

Slide 25: Squamous epithelium. A flat sheet of cells, one layer of cells thick.

Slide 26: Stratified squamous epithelium. The dark purple border is composed of layers of squamous cells - therefore it is called stratified.

Slide 27: Ciliated columnar epithelium. The dark purple cells making up the

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.	pyramidalis m.	rectus abdominis m.
rectum	ureter	urinary bladder
Spongy urethra	prostate gland	prostatic urethra
seminal vesicle	ductus (vas) deferens	spermatic cord
scrotum	corpus spongiosum	testis
epididymis	corpus cavernosum	membranous urethra
penis	pampiniform venous plexus	ejaculatory duct
glans penis		

Structures of the female sexual organ:

ureter	external anal sphincter	internal anal sphincter
pyramidalis m.	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	urethra	

Structures of the kidney:

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

Structures of the liver: Human model

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		tracheal cartilages
arytenoid cartilage		corniculate (Santorini) cartilage,
cuneiform (Wrisberg's) cartilage,		

Structures of the lung: Human model

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

Miscellaneous structures:

Spleen	thyroid gland	thymus gland
adrenal glands	inguinal ligament	

Structures of the Jaw:

masseteric tuberosity	alveolar process,
oblique line,	inferior alveolar AVN
mental AN	enamel,
dentine	pulp
cementum	crown
root	neck
central incisor	lateral incisor
canine	premolar (1st, 2nd, 3rd)
molar (1st, 2nd, 3rd)	

Internal Anatomy: Cataver

You should be able to identify the following internal structures in your cat:

Digestive System:

greater omentum	esophagus
duodenum	ascending colon
pancreas	descending colon
mesentery	transverse colon
stomach	jejunum
gallbladder	ileum
spleen	cecum

Structures of the liver:

right lateral lobe	right median lobe
left median lobe	left lateral lobe
caudate lobe	

Respiratory System:

anterior, middle, posterior lobes (right/left)
right mediastinal (accessory) lobe

diaphragm
trachea

Urogenital System:

kidney (renal capsule, renal cortex, renal medulla, renal pelvis)
urinary bladder
ureter
urethra
ovary
penis
testis

Circulatory System:

pericardium

THE CIRCULATORY SYSTEM

You are responsible for the vessels listed below. Please note that there is a list that applies to the cat and a list that applies for the human. Typically, the easiest way to find blood vessels is to find their associated organs first. For example, rather than trying to count the number of branches off the abdominal aorta until you reach the renal artery, find the kidney, dissect away the fat around it until the artery is visible and then you can follow the renal artery from the kidney back to the abdominal aorta.

Be particularly careful with the blood vessels of the heart, since the cat only has two major vessels leaving the aorta, while humans (as you will see on the models) have three.

Histology: You are responsible for the following slides:

Slide 28: Artery, vein, and nerve. Arteries are distinguished from veins by the presence of a thick muscular wall and the presence of an internal elastic membrane that gives the interior of the lumen a "crinkly" appearance. The lumen of either may be empty or have some blood. Try and distinguish the tunica intima, media and externa that comprise the wall of blood vessels. The nerve is a round area filled with solidly packed circles - these are cross sections across nerve fibres.

Slide 29: Human blood. The majority of blood is composed of anucleated erythrocytes that contain hemoglobin to transport oxygen. Leukocytes stain dark purple and have nuclei. They use the blood and lymph systems to move to sites of infection. Learn the proper names! Do not call them red and white blood cells.

Note: In your **cat**, arteries, veins and the hepatic portal system are injected with red, blue and yellow latex, respectively.

Arteries Only (Cataver)

Aorta
Common carotid (R/L)
Thoracic aorta
Abdominal aorta
Celiac
Superior mesenteric
Inferior mesenteric
Inferior pancreaticoduodenal
Gastric
Splenic

Veins Only (Cataver)

Anterior (superior) vena cava
Azygos
Internal jugular (R/L)
External jugular (R/L)
Transverse jugular
Posterior (inferior) vena cava
**Common iliac (R/L)
(**note that there is no common iliac artery)

Arteries and Veins (Cataver):
pulmonary (R/L)
brachiocephalic artery
brachiocephalic veins (R/L)

subclavian (R/L)
axillary (R/L)
brachial (R/L)
subscapular (R/L)
internal mammary (R/L)
renal (R/L)
spermatic/ovarian (R/L)
iliolumbar (R/L)
external iliac (R/L)
internal iliac (hypogastric) (R/L)
deep femoral (R/L)
femoral (R/L)

The Hepatic Portal System (Cataver)

The following veins form a distinct venous system called the hepatic portal system. They are injected with yellow latex in your cat. Be sure that you understand what is meant by the term portal system and why it is so important in the body.

Hepatic portal v.
Coronary v.
Gastrosplenic v.
Superior pancreaticoduodenal v.
Inferior pancreaticoduodenal v.
Inferior mesenteric v.
Superior mesenteric v.
Intestinal v.

Structures of the Human Heart

atrium (right & left)	orifice of SVC
auricle (right & left)	orifice of IVC
ventricle (right & left)	orifice of coronary sinus
apex	orifice of pulmonary vv.
base	orifice of pulmonary aa.
superior vena cava	orifice of right coronary a.
inferior vena cava	orifice of left coronary a.
ascending aorta	fossa ovalis (remnants)
arch of aorta	tricuspid valve
descending aorta	bicuspid (mitral) valve
brachiocephalic trunk	semilunar valve of pulmonary a.
left common carotid a.	semilunar valve of aorta
left subclavian a.	papillary mm.
ligamentum arteriosum	chordae tendineae
right coronary a.	trabeculae
left coronary a.	
posterior interventricular a. (post. descending br. of rt. coronary a.)	
anterior interventricular a. (ant. descending br. of lt. coronary a.)	
circumflex a.	
great cardiac v.	pectinate m.
coronary sinus	moderator band
pulmonary trunk	trachea
pulmonary aa. (right & left)	bifurcation of trachea (carina)
pulmonary vv. (right & left)	right bronchus
brachiocephalic vv. (right & left)	left bronchus

Vessels of the lower extremities:

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

Vessels of the upper extremities:

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

Vessels of the head and neck:

superficial temporal a.	occipital a.
supratrochlearis a.	maxillary a.
common carotid a.	internal carotid a.
external carotid a.	brachiocephalic trunk
thyrocervical trunk	subclavian a.
internal jugular v.	external jugular v.

Vessels of the thorax:

intercostal aa.	intercostal vv.
azygos v.	thoracic aorta

Vessels of the abdomen:

left gastric a.	gastroepiploic a.
gastroduodenal a.	common hepatic a.
portal v.	hepatic a.
superior mesenteric a.	superior mesenteric v.
celiac trunk	splenic a.
splenic v.	colic v.
colic a.	abdominal aorta
renal v.	renal a.
testicular (ovarian) a.	common iliac a.
common iliac v.	inferior mesenteric a.
inferior mesenteric v.	short gastric aa.
pancreaticoduodenal aa.	intestinal aa.

SENSORY STRUCTURES

You will be using models of the eye and ear to identify the individual parts of each structure. You are responsible for all parts labeled in your lab manual.

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.

Appendices

FORAMINA OF CRANIAL BASE

1. Foramina of cribriform plate
 - CN I-olfactory nerve bundles
2. Optic canal
 - CN II-optic nerve
3. Superior orbital fissure
 - CN III-oculomotor
 - CN IV- trochlear
 - CN V₁-trigeminal
 - CN VI -abducens
4. Foramen rotundum
 - CN V₂-trigeminal
5. Foramen ovale
 - CN V₃-trigeminal
6. Foramen spinosum
 - middle meningeal artery
6. Foramen lacerum
 - internal carotid artery
7. Internal acoustic meatus
 - CN VII-facial
 - CN VIII-vestibulocochlear
8. Jugular foramen
 - CN IX-glossopharyngeal
 - CN X-vagus
 - CN XI-spinal accessory
 - sigmoid sinus
9. Hypoglossal canal
 - CN XII-hypoglossal
10. Foramen magnum
 - medulla oblongata
 - vertebral artery

**Department of Biology
Laboratory and Teaching Assistant Evaluation
Biology 2012-Human Internal Anatomy**

Instead of waiting until the end of term for course evaluations, it would be advantageous to you and me to know if there are areas, pertaining to the labs that could be improved upon, or conversely should be maintained before the course is over. Please take your time to complete this questionnaire. To remain anonymous, just drop this in the box in the hallway just outside this room. Thanks for the feedback.

T.A.'s Name: _____

The T.A. demonstrated a sound knowledge of the subject material	1	2	3	4	5
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The T.A. was helpful when called upon	1	2	3	4	5
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The T.A. worked in a professional matter	1	2	3	4	5
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Do you have any suggestions (constructive!) which may help to improve the T.A.'s performance/ability? (Please use the back of this sheet if more space is needed.)

The Labs: The labs have been an enjoyable learning experience	1	2	3	4	5
--	---	---	---	---	---

List three things you like about these labs:

- 1.
- 2.
- 3.

List three things you dislike about these labs:

- 1.
- 2.
- 3.

Laboratory and Teaching Assistant Evaluation
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