

**STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK**



COURSE OUTLINE

BIOL 218 – Human Anatomy and Physiology II

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**School of Science, Health and Criminal Justice
Science Department
May 2015**

- A. **TITLE:** Human Anatomy and Phys
- B. **COURSE NUMBER:** BIOL218
- C. **CREDIT HOURS:** 4
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** 15 weeks
- F. **SEMESTER(S) OFFERED:** Fall, Winter, Spring, Summer
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
3 lecture hours and 3 laboratory hours per week
- H. **CATALOG DESCRIPTION:** This is the second in a sequence of two courses that studies the detailed anatomy and physiology of the human body. Topics include the anatomy and physiology of the endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary, and reproductive systems. Also the subjects of the immune system, metabolism, fluid-electrolyte-acid-base balance, and pregnancy and development will be covered. The laboratory will include a dissection of the cat.
- I. **PRE-REQUISITES/CO-REQUISITES:** Human Anatomy & Physiology I (BIOL 217) or equivalent or permission of instructor.
- J. **GOALS (STUDENT LEARNING OUTCOMES):**
By the end of this course, the student will be able to:

<i>Course Objective</i>	<i>Institutional SLO</i>
1. Identify and name the major organs and associated structures of the endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary and reproductive systems.	3. Prof. Competence
2. List and describe the functions of the major endocrine system hormones. Describe the mechanical and electrical events of the heart and the regulation of these events. Explain the regulation and blood flow patterns for the arterial and venous systems.	3. Prof. Competence
3. Analyze the composition and describe the functions of blood. Explain the process of blood typing and the implications for blood transfusions. List and describe the functions of the lymphatic organs and tissues. Describe the division of the immune system and their functions.	3. Prof. Competence
4. Explain the mechanics of breathing, transport of respiratory gases, gas exchange and the regulation of these events. Explain the digestive processes of the digestive organs and the regulation of these	3. Prof. Competence

processes.	
5. Describe the process of urine formation and explain the regulation of this process. Describe the events of the male and female reproductive cycles and how these events are regulated.	3. Prof. Competence

K. TEXTS:

Marieb, Elaine N and Katja Hoehn, *Anatomy and Physiology*, 4th edition, Benjamin/Cummings Inc., 2011

NOTE – Any edition of *Anatomy and Physiology* by Marieb can be used
Francis C., Taylor J. and R. Tavernier, *Anatomy and Physiology Laboratory Manual*, SUNY Canton, 2012.

HIGHLY Recommended and available at the SUNY Canton Bookstore

Isac, M. James and Eugene Rutheny. *The Home Lab: A Photo Guide for Anatomy Lab Materials*, 2003

L. REFERENCES: NA

M. EQUIPMENT: Cat dissection voucher and gloves, available at SUNY Canton Bookstore. Arrangements to purchase these items will be made towards the middle of the semester.

N. GRADING METHOD:

A	90 and above
B+	85 to 89
B	80 to 84
C+	75 to 79
C	70 to 74
D+	65 to 69
D	60 to 64
F	60 and below

O. MEASUREMENT CRITERIA/METHODS:

- Term tests
- Lab exams
- Final exam
- Online quizzes
-

P. DETAILED COURSE OUTLINE:

- I. Endocrine system
 - A. Hormone type and cell interaction
 - B. Major endocrine organs and their hormones
- II. Cardiovascular system
 - A. Macroscopic and microscopic heart anatomy
 - B. Coronary circulation
 - C. Cardiac muscle fibers
 - D. Sequence of excitation
 - E. Mechanical events of heart contraction
 - F. Cardiac output

- G. Structure of blood vessels
- H. Arteriole, capillary and venous systems
- I. Blood pressure and circulation physiology
- J. Tissue perfusion
- K. Blood structure and function
- L. Erythrocyte anatomy and function
- M. Leukocyte anatomy and function
- N. Hemostasis
- O. Transfusion
- III. Lymphatic system
 - A. Lymphatic vessel structure
 - B. Lymphatic tissues and organs
- IV. Immune system
 - A. Innate defense -surface barriers
 - B. Innate defense – cells and chemicals
 - C. Adaptive defense
 - D. Antigens
 - E. Humoral Immune response
 - F. Cellular Immune response
- V. Respiratory system
 - A. Functional anatomy of the respiratory system
 - B. Mechanics of breathing
 - C. Physical rules of gas exchange
 - D. Respiratory transport of gases
 - E. Control of respiration
- VI. Digestive system
 - A. Digestive processes
 - B. Organs of digestion – macroscopic and microscopic
 - C. Digestion and absorption of nutrients
 - D. Defecation
 - E. Nutrition
 - F. Metabolism
- VII. Urinary system
 - A. Kidney anatomy – macroscopic and microscopic
 - B. Nephron anatomy and physiology
 - C. Urine formation
 - D. Micturition
 - E. Osmoregulation – cellular and systemic
- VIII. Reproductive system
 - A. Anatomy of the male and female reproductive systems
 - B. Gamete production – physiological processes and hormonal regulation
 - C. Sexually transmitted diseases

Q. LABORATORY OUTLINE:

***Note that students must be able to identify all structures without a word bank or similar aid.**

I. Body Organs and Endocrine System

- A. Label and identify endocrine anatomy on the torso models and posters.

- B. Identify the microscopic anatomy of the thyroid, adrenal, parathyroid and pituitary glands.
- C. Answer questions based on the experiments seen in the endocrine system video.
- D. Identify the major body organs listed using the torso models and posters. Be able to answer basic questions about the primary function of the organs.

Endocrine Anatomy

pineal gland
hypothalamus
pituitary gland
thyroid gland
thymus gland
adrenal glands
pancreas
ovary
testis

Body Organs

heart
lungs
stomach
liver
pancreas
gallbladder
spleen
small intestine
large intestine
kidneys
bladder
ovaries
uterus
testis

II. Cardiovascular System

- A. Label and identify the heart anatomy structures.
- B. Define the terms systole, diastole and cardiac cycle. Describe the events of the cardiac cycle using an ECG recording.
- C. Relate heart sounds to events in the cardiac cycle and be able to identify the heart sounds on an ECG recording.
- D. Define a pulse, pulse deficit, the protocol required for determining a pulse and the calculation for determining a pulse deficit.

- E. Be able to explain the protocol for determining blood pressure. Understand and be able to explain the effects of exercise and posture on blood pressure.
- F. Understand how skin colour can be used as an indicator of circulatory function, including the influence of chemical and physical factors on skin colour.
- G. Be able to identify the deflection waves and relate them to the events of the cardiac cycle on an ECG recording.
- H. Be able to calculate heart rate using an ECG recording.
- I. Be able to identify heart sounds on an ECG recording.
- J. Describe the composition of blood, including the relative proportions of each component. Be able to discuss which conditions may result from an imbalance in leukocyte or erythrocyte numbers.
- K. Be able to identify the microscopic structure of erythrocytes, platelets and the **five** types of leukocytes.
- L. From a centrifuged hematocrit tube, be able to calculate the percent of each component in the blood.
- M. Understand how blood typing is performed. Be able to determine an individual's blood type following a blood-typing experiment. Be able to discuss blood transfusions using the terms agglutination, donor and recipient.
- N. Be able to identify arteries and veins microscopically. Further, be able to identify the layers of the vessel walls on a microscope slide. Be able to identify the arteries and veins listed on the objective sheets on the cat, torso, vascular skull, arm and leg models.

Atria: Receiving Chambers

atria

atrial septum

auricles

pectinate muscles

fossa ovalis

superior vena cava

inferior vena cava

opening for coronary sinus

pulmonary veins

Ventricles: Discharging Chambers

ventricles

interventricular septum

trabeculae carneae

pulmonary trunk

pulmonary arteries

ascending aorta

Aorta

ascending aorta

aortic arch
descending aorta
brachiocephalic artery
left common carotid artery
left subclavian artery
ligamentum arteriosum

Valves

atrioventricular valves
chordae tendineae
pulmonary semilunar valve
aortic semilunar valve
papillary muscles

Coronary Circulation

coronary arteries
circumflex artery
anterior interventricular artery
marginal artery
posterior interventricular artery
great cardiac vein
small cardiac vein
middle cardiac vein
coronary sinus

THORACIC CAVITY

Arteries

ascending aorta
aortic arch
descending aorta
thoracic aorta*
brachiocephalic artery*
right subclavian artery*
left common carotid artery*
right common carotid artery*
left subclavian artery*
external carotid artery
internal carotid artery
vertebral artery

ABDOMINAL CAVITY

Arteries

inferior phrenic artery
celiac trunk

Veins

azygous vein
superior vena cava*
r&l brachiocephalic veins*
r&l internal jugular veins
r&l external jugular veins*
r&l subclavian veins*

Veins

inferior vena cava*
hepatic veins

left gastric artery
splenic artery
hepatic artery
superior mesenteric artery*
renal artery*
suprarenal artery*
gonadal artery*
inferior mesenteric artery*
abdominal aorta*

superior mesenteric vein*
inferior mesenteric vein*
hepatic portal vein
renal vein*
suprarenal vein*
gonadal vein*

BRAIN

Arteries

basilar artery
posterior communicating artery
posterior cerebral artery
middle cerebral artery
anterior cerebral artery
anterior communicating
artery

ARMS

Arteries

axillary artery
brachial artery
ulnar artery
radial artery
deep palmar arch
superficial palmar arch
digital artery

Veins

axillary vein
brachial vein
ulnar vein
radial vein
median cubital vein
cephalic vein
basilic vein

LEGS

Arteries

common iliac artery*
external iliac artery
internal iliac artery
femoral artery
popliteal artery
anterior tibial artery
posterior tibial artery
fibular artery
arcuate artery
digital artery

Veins

common iliac vein*
external iliac vein
internal iliac vein
femoral vein
popliteal vein
anterior tibial vein
posterior tibial vein
fibular vein
great saphenous vein
small saphenous vein

III. Lymphatic System

A. Identify the anatomical structures of the lymphatic system

Pharyngeal tonsil (T)

Palatine tonsil

Thymus gland

Spleen

Inguinal lymph nodes

Axillary lymph nodes
Cervical lymph nodes
Lymphatic vessels
Right lymphatic duct
Cisterna chyli
Thoracic duct
Entrance of 2 ducts into the subclavian veins
Appendix

IV. Respiratory System

- A. Identify the upper and lower respiratory structures listed on the attached sheet. Note that you will be tested using the models, torso and posters.
- B. Define and be able to calculate lung capacities and volumes by using the equations discussed in lab.
- C. Based on the tests performed in lab, answer questions about factors that influence respiratory rate.
- D. Based on the tests performed in lab, answer questions about the function of buffers and the role of the blood as a buffer

V. Digestive System

- A. Identify the digestive system structures listed on the attached sheets. Note that you will be tested using the mandible model, torso, cat and posters.
- B. Identify a slide of small intestine, locating the villi, lumen and muscular layers

Mandible Model

body of mandible
ramus of mandible
angle of mandible
mandibular notch
condyloid process
coronoid process
masseter muscle
temporalis muscle
gingivae
teeth
incisors
canines(cuspids)
premolars(bicuspid)
molars
enamel
dentine
dental pulp
root canal

Small Intestine Model

villus
lacteal
goblet cells
columnar epithelium
intestinal crypts
peyer's patch
lymphocytes
circular muscle layer
longitudinal muscle layer
afferent artery of villus
efferent vein of villus
submucosa
mucosa

mandibular foramen

inferior alveolar

artery, vein & nerve

mental foramen

mental artery, vein & nerve

Sagittal Head Model & Poster

oral orifice

oral cavity

oral mucosa

mylohyoid muscle

hyoid bone

tongue

lingual tonsil

hard palate

soft palate

uvula

fauces

palatine tonsil

parotid gland

submaxillary gland(submandibular gland)

sublingual gland

oropharynx

laryngopharynx

esophagus

Thoracic Cavity

esophagus

diaphragm muscle

location of esophageal hiatus

cardiac sphincter

Stomach

cardia

fundus

body

pylorus

pyloric sphincter

rugae

Pancreas

pancreatic duct

Gall bladder

cystic duct

R & L hepatic ducts

greater curvature
lesser curvature
greater omentum

Small intestine

duodenum
duodenal papilla
ileum
jejunum

Large intestine

cecum
ileocecal valve
ascending colon
hepatic flexure
transverse colon
splenic flexure
descending colon
sigmoid colon
rectum
mesentery
appendix

common hepatic duct
common bile duct

Liver

right lobe
left lobe
caudate lobe
quadrate lobe
falciform ligament

Male & Female Pelvis Models

parietal peritoneum
visceral peritoneum
sigmoid colon
rectum
anal canal
internal anal sphincter
external anal sphincter
anus

Spleen

VI. Urinary System

- A. Identify the urinary system structures listed on the attached sheets. Note that you will be tested using the kidney models, renal corpuscle model, renal lobule model and cat.
- B. Identify glomeruli on a slide of kidney tissue. Additionally, distinguish between a slide of healthy kidney and kidney infarction.
- C. List normal and abnormal urinary components.
- D. Use urinary dip sticks to identify abnormal urinary components in unknown samples of urine.
- E. Correlate the presence of abnormal urinary components with specific metabolic disease conditions.

Renal Capsule
Renal Hilum
Renal Cortex
Renal Medulla
Renal Pyramid
Renal Papilla
Renal Medulla
Renal Column

Distal Convoluted Tubule
Renal Corpuscle
Proximal Convoluted Tubule
Loop of Henle
Collecting Duct
Renal Pelvis
Major Calyx
Minor Calyx
Ureter
Renal Vein
Interlobar vein
Arcuate Vein
Renal Artery
Interlobar Artery
Arcuate Artery

VII. Reproductive System

- A. Identify the reproductive system structures listed on the attached sheets. Note that you will be tested using the pelvis models, torso models and the cat.
- B. Identify a slide of testis and ovary. Identify the required cell types on each slide

MALE PELVIS AND TORSO

Scrotum

testis

seminal vesicle

ductus (vas) deferens

ejaculatory duct

spermatic cord

prostate gland

bulbourethral gland

epididymis

Penis

bulb of penis

prepuce

glans penis

corpus spongiosum

corpus cavernosum

bulbospongiosus muscle

ischiocavernosus muscle

Urethra

prostatic urethra

membranous urethra

spongy (penile) urethra
urogenital diaphragm
external urethral sphincter
external urethral orifice

FEMALE PELVIS AND TORSO

Ovary

ovarian ligament
suspensory ligament of ovary
uterine tube
infundibulum of uterine tube
fimbriae

Uterus

perimetrium
myometrium
endometrium
round ligament
uterosacral ligament

Cervix

posterior fornix
anterior fornix

Vagina

vaginal canal
vaginal orifice
urogenital diaphragm
labium majus
labium minus
clitoris
mons pubis