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

COURSE OUTLINE

BIOL 218 – Human Anatomy and Physiology II

Prepared By: Ron Tavernier, PhD

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:

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identify and name the major organs and associated structures of the endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary and reproductive systems.</td>
<td>3. Prof. Competence</td>
</tr>
<tr>
<td>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.</td>
<td>3. Prof. Competence</td>
</tr>
<tr>
<td>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.</td>
<td>3. Prof. Competence</td>
</tr>
<tr>
<td>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</td>
<td>3. Prof. Competence</td>
</tr>
</tbody>
</table>
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.

K. **TEXTS:**

**NOTE** – Any edition of *Anatomy and Physiology* by Marieb can be used
HIGHLY Recommended and available at the SUNY Canton Bookstore

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:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90 and above</td>
</tr>
<tr>
<td>B+</td>
<td>85 to 89</td>
</tr>
<tr>
<td>B</td>
<td>80 to 84</td>
</tr>
<tr>
<td>C+</td>
<td>75 to 79</td>
</tr>
<tr>
<td>C</td>
<td>70 to 74</td>
</tr>
<tr>
<td>D+</td>
<td>65 to 69</td>
</tr>
<tr>
<td>D</td>
<td>60 to 64</td>
</tr>
<tr>
<td>F</td>
<td>60 and below</td>
</tr>
</tbody>
</table>

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 carnae
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
atrophicventricular 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

Veins
azygous vein
superior vena cava*
right & left brachiocephalic veins*
right & left internal jugular veins
right & left external jugular veins*
right & left subclavian veins*

ABDOMINAL CAVITY
Arteries
inferior phrenic artery
celiac trunk

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*

**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

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**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

<table>
<thead>
<tr>
<th>Mandible Model</th>
<th>Small Intestine Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>body of mandible</td>
<td>villus</td>
</tr>
<tr>
<td>ramus of mandible</td>
<td>lacteal</td>
</tr>
<tr>
<td>angle of mandible</td>
<td>goblet cells</td>
</tr>
<tr>
<td>mandibular notch</td>
<td>columnar epithelium</td>
</tr>
<tr>
<td>condyloid process</td>
<td>intestinal crypts</td>
</tr>
<tr>
<td>coronoid process</td>
<td>peyer's patch</td>
</tr>
<tr>
<td>masseter muscle</td>
<td>lymphocytes</td>
</tr>
<tr>
<td>temporalis muscle</td>
<td>circular muscle layer</td>
</tr>
<tr>
<td>gingivae</td>
<td>longitudinal muscle layer</td>
</tr>
<tr>
<td>teeth</td>
<td>afferent artery of villus</td>
</tr>
<tr>
<td>incisors</td>
<td>efferent vein of villus</td>
</tr>
<tr>
<td>canines(cuspids)</td>
<td>submucosa</td>
</tr>
<tr>
<td>premolars(bicuspids)</td>
<td>mucosa</td>
</tr>
<tr>
<td>molars</td>
<td></td>
</tr>
<tr>
<td>enamel</td>
<td></td>
</tr>
<tr>
<td>dentine</td>
<td></td>
</tr>
<tr>
<td>dental pulp</td>
<td></td>
</tr>
<tr>
<td>root canal</td>
<td></td>
</tr>
</tbody>
</table>
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  common hepatic duct
lesser curvature  common bile duct
greater omentum

**Small intestine**
duodenum
duodenal papilla
ileum
jejunum

**Liver**
right lobe
left lobe
caudate lobe
quadrate lobe
falciform ligament

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

**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