ANP 1105E
ANATOMY & PHYSIOLOGY I

Basic Cellular Physiology & the Anatomy and Physiology of the Cardiovascular, Lymphatic & Respiratory Systems

Course outline: September – December 2015

ANP 1105 is the first of three ANP courses offered within the Faculty of Health Sciences. This course includes a review of tissue and cell morphology, biochemistry of the cell and physiological concepts including diffusion, osmosis, membrane transport and homeostasis. The anatomy and physiology of nerve and muscle cells will be examined followed by in-depth study of the anatomy and physiology of blood and the cardiovascular, lymphatic and respiratory systems. This is a 3-credit course, with 3 hours of lectures per week and three exams throughout the duration of the course.

INSTRUCTORS:
Dr. Joanna Komorowski (course coordinator) **E-mail:**jkomorow@gmail.com
Dr. Wafa Djerboua **E-mail:**wyahiaou@uottawa.ca
Office hours: by appointment

REQUIRED TEXTBOOK: E.N. Marieb & K. Hoehn: **Human Anatomy & Physiology** (10th edition, 2016). *The textbook package is available at 3 bookstores: the main bookstore at the downtown campus (UCU bldg), the Agora bookstore and the Health Sciences Bookstore in the General Hospital.* ***You need the book*** *and* ***the online access code for Mastering A&P*** *that is packaged with the book or sold separately, before you can do any of the Mastering A&P assignments.*

WEBSITE: From the university home page http://www.tlss.uottawa.ca, under "Quick Picks", choose Virtual Campus. Login as you would for InfoWeb and select ANP 1105E

LECTURES:

Tuesdays	14:30 – 16:00	SITE B0138
Fridays	16:00 – 17:30	SITE B0138

COURSE EVALUATION

Exam 1 **- Topics 1 & part of topic 2**	Tuesday, October 6	**25%** final mark
Exam 2 **– Part of topic 2, topic 3 and part of topic 4**	Tuesday, November 10	**25%** final mark
Mastering A&P Online Assignments	Throughout the term	**10%** final mark
Exam 3 (Final Exam)	December (to be determined)	**40%** final mark
TOTAL		**100%**
Supplemental exam	February 2016	

- ***Online assignments*** *(10% of final mark) will be described in detail on September 9, 2015.*
- ***Mastering A&P online assignments code: MAPKOMOROWSKI26175***
- ***Supplemental exams*** *- available for students who fail an ANP course but do well enough to obtain an* ***E****. Students who fail with F must repeat the course.*
- ***To determine your best way(s) of learning*** *you can follow the links within the VARK site (http://www.vark-learn.com/english/index.asp).*

TO YOUR KNOWLDEGE:

- Power-point lecture slides and/or lecture PDF documents from the professors are available on the course website. Please note that last minute updates to the notes by the professors may occur just before the lecture. If you wish to print the notes, do it no earlier than 1 day prior to the lecture.

- Please arrive on time. If you must leave before the end of the class, inform the professor in advance and try to sit close to an exit so that you do not disturb the class when you leave.

- Please examine key deadlines (note that the midterm exam is scheduled before the last date to withdraw) and Health Sciences regulations on minimum grades required and on academic fraud.

- Visit the Student Academic Success Service (SASS) website, check the access services and read a note they prepared for students. Check the mentoring services provided for this course. You can get more information from mentors@mail.health.uOttawa.ca.

- Deferred exams are scheduled one week after the regular exam unless medical condition prevents the student from writing the exam at this time. For the final exam the form entitled "Request for a deferred mark" must be completed after receiving approval from the course coordinator.

ANP 1105E COURSE SCHEDULE

Lecture number	Date	Subject	Professor
1	September 11	Introduction Structural Organization: Cells	Dr. Joanna Komorowski
2	September 15	Structural Organization: Membrane Transport	Dr. Joanna Komorowski
3	September 18	Structural Organization: Tissues	Dr. Joanna Komorowski
4.	September 22	Cellular Physiology of Nerve and Muscle	Dr. Wafa Yahiaoui Djerboua
5.	September 25	Cellular Physiology of Nerve and Muscle	Dr. Wafa Yahiaoui Djerboua
6.	September 29	Cellular Physiology of Nerve and Muscle	Dr. Wafa Yahiaoui Djerboua
7.	October 2	Cellular Physiology of Nerve and Muscle	Dr. Wafa Yahiaoui Djerboua
8.	**October 6**	**MIDTERM 1**	**Dr. Joanna Komorowski**
9.	October 9	Cellular Physiology of Nerve and Muscle	Dr. Wafa Yahiaoui Djerboua
10.	October 13	Homeostasis	Dr. Wafa Yahiaoui Djerboua
11.	October 16	Homeostasis	Dr. Wafa Yahiaoui Djerboua
12.	October 20	Blood	Dr. Wafa Yahiaoui Djerboua
13.	October 23	Blood	Dr. Wafa Yahiaoui Djerboua
14.	**October 27**	**READING WEEK**	**NO LECTURE**
15.	**October 30**	**READING WEEK**	**NO LECTURE**
16.	November 3	The heart	Dr. Joanna Komorowski
17.	November 6	The heart	Dr. Joanna Komorowski
18.	**November 10**	**MIDTERM 2**	Dr. Joanna Komorowski
19.	November 13	The heart	**Dr. Joanna Komorowski**
20.	November 17	Blood Vessels	Dr. Joanna Komorowski
21.	November 20	Blood Vessels	Dr. Joanna Komorowski
22.	November 24	The Lymphatic System	Dr. Joanna Komorowski
23.	November 27	The Respiratory System	Dr. Joanna Komorowski
24.	December 1	The Respiratory System	Dr. Joanna Komorowski
25.	December 4	The Respiratory System	Dr. Joanna Komorowski
26.	December 8	The Respiratory System	Dr. Joanna Komorowski

STUDENT LEARNING OBJECTIVES:

NOTE: Students are strongly encouraged to read the textbook before coming to class. Please complete the assignments on time!!!

1. **Structural Organization of the Human Body & Membrane transport – review *(September 11 -18)*. Dr. Komorowski.**

1.1. Describe the levels of structural organization that make up the human body

1.2. **Cells:**

1.2.1.1 Describe the anatomy and physiology of major structures found in body cells

Assignment #1 (Cells review) is due Monday, September 28.

1.3. Membrane transport:

1.3.1. Describe the structure of the plasma membrane

1.3.2. Describe and differentiate among the various types of transport across the plasma membrane

1.3.3. Describe osmosis and explain its role in fluid homeostasis

1.4. **Tissues**:

1.4.1 Describe the different tissues of the human body

Assignment #2 (Membrane Transport&tissues) is due Monday, Sept. 28.

2. **Cellular Physiology of Nerve and Muscle *(September 22, 25, 29, October 2 and October 9),* Dr. Dierboua.**

2.1. Neurons:

2.1.1. Identify the different regions of the neuron and associate each region with the functions of reception, propagation and transmission of nerve impulses

2.1.2. Explain the phenomena (diffusion of ions, types of ion channels) that are responsible for the electrical activity of neurons (resting membrane potential and action potential)

2.1.3. Describe the factors that influence propagation of the action potential along an axon

2.1.4. Explain the mechanisms of synaptic transmission (synapse, post-synaptic potentials, synaptic integration)

Assignment #3 (Neuron) is due Monday, October 5.

2.2. Muscles:

2.2.1. Describe the microscopic structure of skeletal muscle fibers and explain the cellular mechanisms of excitation-contraction coupling

2.2.2. Describe the neuromuscular junction

2.2.3. Describe the contractile properties of skeletal muscle (motor unit, isotonic & isometric contractions, spatial & temporal summation, etc)

2.2.4. Associate various muscle types with their metabolism and their speed of contraction and rate of fatigue

2.2.5. Compare the properties of smooth muscle with those of skeletal muscle

Assignment #4 (Muscle part 1) is due Monday, October 5.
Assignment #4 (Muscle part 2) is due Monday, October 19.

EXAM #1: Tuesday, October 6 - during class

3. **Homeostasis: Introduction to the Autonomic Nervous System and Endocrine System *(October 7-10).* Dr. Dierboua.**

3.1. Define and identify the main characteristics of homeostasis

3.2. Nervous system:

3.2.1. Compare somatic and autonomic nervous systems

3.2.2. Compare the functional differences between the sympathetic and parasympathetic divisions of the ANS

3.3. Endocrine system:

3.3.1. Distinguish between exocrine and endocrine glands, and localize the major endocrine glands

3.3.2. Describe the different structural classes of hormones and their mechanisms of action

3.3.3. Describe the functional organization of the hypothalamic-pituitary axis

Assignment 5 (Homeostasis) is due Monday, October 19.

4. **Cardiovascular System *(October 21 – November 18).***

4.1. Blood, Dr. Dierboua.

4.1.1. Describe the composition of blood (plasma & formed elements)

4.1.2. Erythrocytes:

4.1.2.1. Describe the structure and function of RBCs; structure and properties of hemoglobin

4.1.2.2. Describe erythropoiesis, mechanisms of control, and life cycle of erythrocytes

4.1.3. Hemostasis:

4.1.3.1. Explain the principal steps and justify the role of platelets and clotting factors in this process

4.1.3.2. Explain the fibrinolytic system and recognize the action of the major anticoagulants

4.1.4. Differentiate among the various blood types and explain the basis of transfusion reactions

Assignment 6 (Blood) is due Monday, November 2.

4.2. The Heart, Dr. Komorowski.

4.2.1. Describe the internal and external anatomy of the heart

4.2.2. Trace the pathway followed by blood in both the pulmonary and systemic circuits

4.2.3. Describe the organization of the coronary circulation

4.2.4. Compare the physiological properties of cardiac muscle cells with those of skeletal muscle cells

4.2.5. Compare the electrical properties of contractile cardiac muscle cells with those of autorhythmic cardiac muscle cells

Assignment 7 (the Heart part 1 and 2) is due Monday, November 9.

4.2.6. Explain how the intrinsic conduction system of the heart allows it to function as a pump.

4.2.7. Explain what is an ECG tracing and the nature of the information it is providing

4.2.8. Explain the events occurring during each phase of the cardiac cycle

4.2.9. Define cardiac output in terms of heart rate and stroke volume

4.2.10. Describe in detail the mechanisms for the regulation of heart rate & stroke volume

Assignment 7 (the Heart part 3) is due Monday, November 16.

EXAM #2: Tuesday, November 10 - during class

5. Blood vessels and hemodynamics, Dr. Komorowski.

5.1.1. Compare and contrast the structure of the walls of arteries, capillaries and veins
5.1.2. Compare the 3 types of arterial vessels
5.1.3. Define microcirculation and compare the three types of capillaries
5.1.4. Describe the structure and functions of the venules and veins
5.1.5. Define blood flow, blood pressure, resistance, peripheral resistance
5.1.6. Illustrate the changes in blood pressure throughout the various vessels of the circulatory system
5.1.7. Explain the factors that affect resistance and justify the importance of arterioles in the control of peripheral resistance
5.1.8. Define systolic and diastolic arterial pressure, pulse pressure and mean arterial pressure
5.1.9. Identify and justify the value for mean capillary blood pressure
5.1.10. Express blood pressure in terms of cardiac output and peripheral resistance
5.1.11. Describe the short-term neural and chemical mechanisms for the regulation of blood pressure
5.1.12. Describe the role of the kidneys in the long-term regulation of blood pressure
5.1.13. Define and explain the mechanisms of autoregulation with regard to local blood flow
5.1.14. Explain the forces that act to influence capillary exchange
5.1.15. Identify the principal arteries and veins of the cardiovascular system: *You will be responsible for arteries and vein up to the level of the wrist and ankle, to each organ and to the brain (to and including the circle of Willis). If you begin early and review often, then you will find it is not as daunting as it looks. However, there will be little "learning time" during the lectures,* ***so it will be up to you to put in the time****.*

Assignment 8: Blood Vessels, due Monday, November 26.

6. The Lymphatic System *(November 21)*. Dr. Komorowski.

6.1. Describe the structure and main functions of the vessels and organs of the lymphatic system
6.2. Explain the origin of lymph as well as its transport

Assignment 9: The lymphatic Sysytem, due Monday, November 26

7. **The Respiratory System *(November 23 – December 5)*, Dr. Komorowski.**

7.1. Describe the structures of each one of the components of the conduction and respiratory zones
7.2. Describe the gross structure of the lungs & the pleural coverings
7.3. Define & explain the following: intrapulmonary, intrapleural & transpleural pressures
7.4. Explain the roles of the diaphragm & accessory muscles during inspiration & expiration (quiet & forced)
7.5. Explain the 3 factors that influence pulmonary ventilation
7.6. Describe how lung volumes & capacities are measured; indicate their physiological significance
7.7. Define dead space and indicated its importance in minute and alveolar ventilation
7.8. Explain the mechanisms underlying the non-respiratory air movements
7.9. State Dalton's Law and use it to describe the composition of atmospheric and alveolar air
7.10. Explain the factors that influence the movement of gases at the air-liquid interface
7.11. List and describe 3 factors that influence the exchange of air and carbon dioxide (lungs)

7.12. Describe the partial pressure gradients that drive oxygen and carbon dioxide movement (tissues)
7.13. Describe completely the transport of oxygen in the blood
7.14. Explain the sigmoidal nature of the oxygen-hemoglobin dissociation curve
7.15. Describe completely the 3 ways in which carbon dioxide is transported in the blood
7.16. Explain the Bohr and Haldane effects
7.17. Associate carbon dioxide levels with blood pH; explain how respiration can regulate blood pH
7.18. Describe how respiration is controlled by the nervous system
7.19. Indicate the effects of the following factors on respiration: Hering Breuer reflex, hypothalamus, cortex
7.20. List the 3 principal chemical factors that influence respiration and explain their mechanisms of action
7.21. Discuss the mechanisms controlling respiration during intense exercise

Assignment 10: (The Respiratory System), due Thursday, December 4.

EXAM #3 (Final): To be determined

Exam #3 will concentrate on the remaining material regarding the heart, blood vessels and hemodynamics as well as the lymphatic and the respiratory systems; however about 15-20% of the final exam will be composed of questions dealing with the material covered in the first two sections of the course.

If you have to miss any exam due to illness, you must obtain the appropriate documentation from the University of Ottawa Health Services (dated the day of the exam) in order to have permission to write a deferred exam. This document must be given to Dr. Komorowski within 5 working days of missing the exam. If you do not write the regular exam or the deferred exam, you will obtain a zero for that section of the course.

Due Dates of Assignments:

Assignment Number	Due Date
1. **Cells Review**	Monday, September 28th
2. **Membrane Transport &the Tissues**	Monday, September 28th
3. **Neurons**	Monday, October 5th
4. **Muscle part 1**	Monday, October 5th
Muscle part 2	Monday, October 19th
5. **Homeostasis**	Monday, October 19th
6. **Blood**	Monday, November 2th
7. **The Heart part 1 and 2**	Monday, November 9th
The Heart part 3	Monday, November 16th
8. **Blood Vessels**	Thursday, November 26th
9. **Lymphatic System**	Thursday, November 26th
10. **Respiratory Systems**	Thursday, December 10th

You should always complete the assignments on time; it will help you to better understand the material and to be prepared for the exams.

- *All assignments will be available as study aids until the end of the final exam period.*