

# ANP1105A ANATOMY & PHYSIOLOGY I FALL 2019

## 1. THE BASICS

**A. Dates:** Fall 2019, running from September-December. This is a 3-credit course, with 3 hours of lectures per week during the fall term.

**Lectures:**

Monday	2:30 – 4:00 pm	CRX C140
Thursdays	4:00 – 5:30 pm	CRX C140

**B. Instructors:** There are two instructors for the course.

**Dr. Stephen Gee** (stevegee@uottawa.ca) will cover the first half of the course (September 5 – October 21).

**Dr. Michael Downey** (mdowne2@uottawa.ca) will cover the second half of the course (October 24 – December 2).

**C. You are in Section A:** This is the first of three ANP courses offered within the Faculty of Health Sciences. There are a lot of students who take this class so the course is divided into different sections taught by different instructors. **You will be required to access online resources that are specific for your sections.**

**D. Office Hours:** Office hours for questions outside class will be communicated by each instructor in the first class of each section. They will also be posted on BrightSpace.

**E. What you will learn:** The course provides an introduction to tissue and cell morphology, biochemistry of the cell and physiological concepts including diffusion, osmosis, membrane transport and homeostasis. The 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.

**F. Learning Tools & Resources:**

**Textbook:** E.N. Marieb & K. Hoehn: Human Anatomy & Physiology (11th edition, 2018) Benjamin Cummings.

- The textbook package (hardcover or loose-leaf and includes the Mastering A and P access code).
- Textbook package is available at the main bookstore at the downtown campus (UCU Bldg; <http://www.bkstr.com/ottawastore/home>) and the Agora bookstore (145 Besserer Street; [SFUO.ca/ANP1105A](http://SFUO.ca/ANP1105A)).
- You need the book and the online access code for Mastering A&P that is packaged with the textbook in order to be able to do the Mastering A&P assignments.
- The Website address for the Mastering A& P program is <https://www.pearsonmylabandmastering.com/northamerica/>  
The Mastering Course ID to use with the website is **downey23601**
- The Mastering A&P access code can also be purchased as a stand-alone item for students who have elected to purchase a second hand textbook.

**Brightspace access:** Go to university's home page; scroll down to the bottom of the page and select Students-uoZone

**Step 1.** On the Students page, select Login to Virtual Campus and select that again on the next page.

**Step 2.** Scroll down & enter your username (student number) and your uoZone password

**Step 3.** Click "Login" and this will bring you to a list of courses for which you have online access.

**Step 4.** Select ANP1105A.

While this might seem confusing right now, we will go over it in class and we are confident that you will find the Mastering A&P system helpful.

## **2. EVALUATION:**

### **Summary:**

There are two formats for evaluation: Three (3) multiple choice exams, and 9 short assignments that are completed online through the Mastering A&P platform outlined above and in class.

<b>Evaluation criteria</b>	<b>Date</b>	<b>% Grade</b>
Mid-term exam 1	Thursday October 10 (in class)	26
Mid-term exam 2	Thursday November 14 <sup>th</sup> (in class)	26
Mastering A&P Assignments	Various (see below)	8
Final Exam	To be determined	40

### Details:

#### **A. Exams:**

There will be three (3) exams throughout the duration of the course, as indicated in the detailed outline. The exams are a multiple choice format. Please note that Exam 1 will deal with all material from the Structural Organization of the Human Body up through the Introduction to Nerve & Muscle. Exam 2 will deal with Homeostasis, Blood and the Heart. Finally, Exam 3 (the final exam) will concentrate on Blood Vessels & Hemodynamics as well as the Lymphatic and Respiratory systems. However, ~15% of the final exam will be composed of questions dealing with material covered in the first two sections of the course.

**If you are sick for an exam:** If you have to miss any exam due to illness, you must obtain the appropriate documentation from your doctor or the University of Ottawa Health Services (dated the day of the exam, or the day before the exam) in order to have permission to write a deferred exam. You must contact me within 5 working days of missing the exam and provide me with the medical documentation as soon as possible after that. If you do not write the regular exam or the deferred exam, you will obtain a zero for that section of the course.

The deferred first midterm for those with approved medical documentation will take place on Wednesday, October 16, 2019, 12:30pm-3:30pm and the location is RGN 2149 (hospital campus). The deferred second midterm for those with approved medical documentation will take place on Thursday, November 21, 2019 9:00am-12:00pm and the location is RGN2149 (hospital campus). The deferred final exam will take place during February Reading Week.

**Option for supplemental exams:** Supplemental exams are now available for those students who fail an ANP course but do well enough to obtain an E. Students who fail with an F are not eligible for a supplemental exam and must repeat the course. The supplemental exam score will replace the original final exam score in the new calculation of the student's final grade. While both final grades will appear on the student's transcript, only the supplemental mark will be used for grade point calculations. The supplemental exam for ANP1105A will take place during winter term Reading Week and the regulations regarding illness on exam day

indicated in the preceding paragraph also apply to this exam. If you want to write a supplemental exam and are eligible, you must register through the undergraduate studies office of your faculty. You will have to pay a supplemental examination fee. If you register to write the exam but do not turn up to write the exam and you haven't informed your faculty that you will not be present for it one day in advance (or do not follow university regulations if sick on exam day), you will receive the grade "INC" which is equivalent to a failure.

**B. Mastering A&P Assignments  
(Available through the Mastering A&P platform)**

Assignment Number & Name	Available (always 18:00 h)	Due Date (always 23:00 h)	Done?
<b>1. Introduction to Mastering A&amp;P</b>	Now	Friday Sept 20	
<b>2. Cells and Tissues</b>	Now	Friday Sept 20	
<b>3. Membrane Transport &amp; the Neuron</b>	Sunday Oct 6	Friday Oct 11	
<b>4. Muscle</b>	Sunday Oct 13	Friday Oct 25	
<b>5. Homeostasis</b>	Sunday Oct 27	Friday Nov 1	
<b>6. Blood and the Heart</b>	Sunday Nov 10	Friday Nov 15	
<b>7. Blood Vessels</b>	Sunday Nov 17	Friday Nov 22	
<b>8. Lymphatic System &amp; Resp. Anatomy</b>	Sunday Nov 24	Friday Nov 29	
<b>9. Respiratory Physiology</b>	Sunday Dec 1	Friday Dec 6th	

**Notes and tips:**

- i) **Missing Mastering A&P Assignment Due Dates will result in a penalty of 2% per hour late**
- ii) *Don't forget to do the Intro Assignment (#1) first!*
- iii) *All assignments are available as study aids until the end of the final exam period*
- iv) **Don't leave assignments until the last minute!**
- v) Similarly, if you have questions, don't leave them until the night before otherwise it may be difficult for us to help you sort out any problems before the deadline!
- vi) Put these dates into your schedule now so that you don't forget!

# ANP1105 COURSE OUTLINE AND LEARNING OBJECTIVES

## 1. Structural Organization of the Human Body (Sept. 5, 9)

- 1.1. Describe the levels of structural organization that make up the human body
- 1.2. Cells: summarize the major organelles and structures found in body cells
- 1.3. Tissues: describe the different tissues of the human body

**Mastering A&P Assignment #1 (Introduction to Mastering A&P) and #2 (Cells and Tissues) are BOTH due Friday, September 21st.**

## 2. Cellular Physiology of Nerve and Muscle (Sept. 12, 16, 19, 23, 26, 30.)

### 2.1. Membrane Transport:

- 2.1.1. Describe the structure of the plasma membrane
- 2.1.2. Describe and differentiate among the various types of transport across the plasma membrane
- 2.1.3. Describe osmosis and explain its role in fluid homeostasis

### 2.2. Neurons:

- 2.2.1. Identify the different regions of the neuron and associate each region with the functions of reception, propagation and transmission of nerve impulses
- 2.2.2. 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)
- 2.2.3. Describe the factors that influence propagation of the action potential along an axon
- 2.2.4. Explain the mechanisms of synaptic transmission (synapse, post-synaptic potentials, synaptic integration)

**Mastering A&P Assignment #3 (Membrane Transport & Neuron) is due Friday, October 12th.**

### 2.3. Muscles:

- 2.3.1. Describe the microscopic structure of skeletal muscle fibers and explain the cellular mechanisms of excitation-contraction coupling
- 2.3.2. Describe the neuromuscular junction
- 2.3.3. Describe the contractile properties of skeletal muscle (motor unit, isotonic & isometric contractions, spatial & temporal summation, etc)
- 2.3.4. Associate various muscle types with their metabolism and their speed of contraction and rate of fatigue
- 2.3.5. Compare the properties of smooth muscle with those of skeletal muscle

**Mastering A&P Assignment #4 (Muscle) is due Friday  
October 19th.**

**3. Homeostasis: Introduction to the Autonomic Nervous and Endocrine Systems (Oct. 3, 7)**

**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

***EXAM #1: Thursday, October 10th during class***

**Mastering A&P Assignment #5 (Homeostasis) is due Friday,  
November 2nd**

**4. Cardiovascular System (Oct. 21, 24, Oct 28, Oct 31, Nov 4, Nov 7)**

**4.1. Blood:**

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

**4.2. The Heart:**

**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

**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 #6 (Blood and the Heart) is due Friday, November 16th.**

***EXAM #2: Thursday, November 14th during class***

**4.3. Blood vessels and hemodynamics:**

**4.3.1.** Compare and contrast the structure of the walls of arteries, capillaries and veins

**4.3.2.** Compare the 3 types of arterial vessels

**4.3.3.** Define microcirculation and compare the 3 types of capillaries

**4.3.4.** Describe the structure and functions of the venules and veins

**4.3.5.** Define blood flow, blood pressure, resistance, peripheral resistance

**4.3.6.** Illustrate the changes in blood pressure throughout the various vessels of the circulatory system

**4.3.7.** Explain the factors that affect resistance and justify the importance of arterioles in the control of peripheral resistance

**4.3.8.** Define systolic and diastolic arterial pressure, pulse pressure and mean arterial pressure

- 4.3.9. Identify and justify the value for mean capillary blood pressure
- 4.3.10. Express blood pressure in terms of cardiac output and peripheral resistance
- 4.3.11. Describe the short-term neural and chemical mechanisms for the regulation of blood pressure
- 4.3.12. Describe the role of the kidneys in the long-term regulation of blood pressure
- 4.3.13. Define and explain the mechanisms of autoregulation with regard to local blood flow
- 4.3.14. Explain the forces that act to influence capillary exchange
- 4.3.15. 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).*

## **Assignment #7 (Blood Vessels) is due Friday, November Nov 23rd.**

### **5. The Lymphatic System (Nov. 11, 18)**

- 5.1. Describe the structure and main functions of the vessels and organs of the lymphatic system
- 5.2. Explain the origin of lymph as well as its transport

### **6. The Respiratory System (Nov. 21, 25, Nov 28. Dec 2)**

- 6.1. Describe the structures of each one of the components of the conduction and respiratory zones
- 6.2. Describe the gross structure of the lungs & the pleural coverings

## **Assignment #8 (Lymphatic System & Respiratory Anatomy) is due Friday, November 30.**

- 6.3. Define & explain the following: intrapulmonary, intrapleural & transpleural pressures
- 6.4. Explain the roles of the diaphragm & accessory muscles during inspiration & expiration (quiet & forced)
- 6.5. Explain the 3 factors that influence pulmonary ventilation
- 6.6. Describe how lung volumes & capacities are measured; indicate their physiological significance
- 6.7. Define dead space and indicated its importance in minute and alveolar ventilation
- 6.8. Explain the mechanisms underlying the non-respiratory air movements

- 6.9. State Dalton's Law and use it to describe the composition of atmospheric and alveolar air
- 6.10. Explain the factors that influence the movement of gases at the air-liquid interface
- 6.11. List and describe 3 factors that influence the exchange of air and carbon dioxide (lungs)
- 6.12. Describe the partial pressure gradients that drive oxygen and carbon dioxide movement (tissues)
- 6.13. Describe completely the transport of oxygen in the blood
- 6.14. Explain the sigmoidal nature of the oxygen-hemoglobin dissociation curve
- 6.15. Describe completely the 3 ways in which carbon dioxide is transported in the blood
- 6.16. Explain the Bohr and Haldane effects
- 6.17. Associate carbon dioxide levels with blood pH; explain how respiration can regulate blood pH
- 6.18. Describe how respiration is controlled by the nervous system
- 6.19. Indicate the effects of the following factors on respiration: Hering Breuer reflex, hypothalamus, cortex
- 6.20. List the 3 principal chemical factors that influence respiration and explain their mechanisms of action
- 6.21. Discuss the mechanisms controlling respiration during intense exercise

**Assignment #9 (Respiratory Physiology) is due Friday,  
December 7th**

Anatomy is to physiology as geography is to history; it describes the  
theatre of events.

- Jean Fernel

**Credit for original syllabus organization and most of the wording to  
Dr. Jackie Carnegie**