

ANP1105C

ANATOMY & PHYSIOLOGY I: Basic Cellular Physiology & the Anatomy and Physiology of the Cardiovascular, Lymphatic & Respiratory Systems September - December, 2017

Course Description

This is the first of three ANP courses offered within the Faculty of Health Sciences. This 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. This is a 3-credit course, with 3 hours of lectures per week during the fall term.

Course Schedule:	TUESDAYS	11:30 PM - 1:00 PM	UCU AUD
	FRIDAYS	1:00 PM - 2:30 PM	UCU AUD

Professors:	Dr. Joanne Savory, RGN 1106A Course Coordinator Joanne.Savory@uottawa.ca 613-562-5800 ext. 8729	Dr. W. Staines, RGN 3220 wstaines@uottawa.ca 613-562-5800, ext. 8188
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Office hours: By appointment. Please do not hesitate to come see us to discuss course material.

Textbook: Elaine N. Marieb & Katja Hoehn: **Human Anatomy & Physiology** (10th edition, 2015) Benjamin Cummings.

The textbook package is available at the main bookstore at the downtown campus (UCU bldg), the student run Agora bookstore (145 Besserer Street, Ottawa, ON, K1N6A7) and the Health Sciences Bookstore in the General Hospital (451 Smyth Road).

You will need the book **AND** the online access code for Mastering A&P that is packaged with the book in order to be able to do the Mastering A&P assignments. The purchasing options are as follows:

- Hardcover textbook packaged with the Mastering A and P Access Code
- Loose-leaf version (unbound) of the textbook packaged with the Mastering A and P Access Code
- E-book packaged with the Mastering A and P Access Code
- Stand Alone Mastering A and P Access Code (should you choose to buy a used version of the text)

The Mastering Course ID for ANP1105C is **MAPSAVORY05584**

Website: Go to [university's home page](#); scroll down to the bottom of the page and select Students-uoZone. On the Students page, select Login to Virtual Campus. Scroll down & enter your username (student number) and your uoZone password. Click "Login" and this will bring you to a list of courses for which you have online access. Select ANP1105C.

. Power-point lecture slides and/or lecture PDF documents will be available on the course website. Please note that last minute updates to the notes may occur just before the lecture. If you wish to print the notes, you should do so no earlier than 1 day prior to the lecture. You are strongly encourage to review the lecture notes or the relevant pages in the text before coming to class.

Would you like to determine your best way(s) of learning? Check out the VARK site (<http://vark-learn.com>) and take their simple test. You can then follow links within the site to find helpful study advice.

EVALUATION

There will be three exams as well as online assignments throughout the duration of the course, as indicated below. **Exams will be mixed format** ie a combination of multiple choice, true/ false, matching, fill-in-the-blanks and short answer questions and diagrams to be labelled. The exam questions will **ONLY** include the material covered in the lectures, thus the lectures are the best indicator of the depth and breadth of topics for which exam questions will be developed. The syllabus details which topics will be tested on each exam. We do not deviate from the syllabus so please consult the course syllabus if you are unsure of the topics that will be tested on a given exam.

Your grade will be based entirely on the exams (3) and the Mastering A&P (9) and Brightspace (3) assignments. It is not possible to obtain extra credit from additional assignments and/or exams. However, supplemental exams are offered for students who obtain an overall grade of E (see details below). **The distribution of marks is final** and it is not possible to change the weight of the exams or assignments.

EXAM	DATE	% of Final Mark
Midterm 1 (Topics 1 & 2)	Friday, Oct 6 th	24
Midterm 2 (Topic 3 and Topics 4.1 & 4.2)	Tuesday, November 14 th	24
Brightspace Assignment (see schedule below)	Throughout the semester	3
Mastering A&P (see schedule below)	Throughout the semester	7
Final Exam	TBD	42
Total		100%

❖ Exams

- Exam 1 will deal with all material from the Structural Organization of the Human Body up to and including the Introduction to the Introduction to Nerve & Muscle and is worth 24% of the final grade.
- Exam 2 will deal with Homeostasis, Blood and the Heart and is worth 24% of the final grade.
- Exam 3 (the final exam) will concentrate on Blood Vessels & Hemodynamics as well as the Lymphatic and Respiratory systems. However 10-15 % of the final exam will be composed of questions dealing with material covered in the two midterms. The final exam is worth 42% of the final grade.

What to do if you miss an exam

If you have to miss an exam due to illness, you must notify the course coordinator (Dr. Savory) before the exam takes place. You also have 5 school days from the day of the exam to provide appropriate medical documentation indicating that you were seen by your family physician or by University Health Services on or before exam day and found by that health care provider to be too ill on exam day to write your exam. Only then will you be eligible to write a deferred exam. If you do not write the regular exam or deferred exams, you will obtain a zero for that section of the course. You should familiarize yourself with the [University's academic regulations](#) and the policy on [Medical Certificates](#) (<https://www.uottawa.ca/health/>).

For those with valid medical documentation,

- **The deferred midterm 1 exam will only be held on Wednesday October 25th at 9:00 AM in RGN 2113.** RGN is located at 451 Smyth Road and there is a shuttle bus that runs from the downtown campus to RGN. If you miss the deferred exam the doubly deferred midterm 1 exam will take place in February 2018 during Reading Week
- **The deferred midterm 2 exam will only be held on Thursday, November 23rd, 2017 at 1:00 PM in RGN 3248.** If you miss the deferred exam the doubly deferred midterm 2 exam will take place in February 2018 during Reading Week
- The deferred final exam will take place in February 2018 during Reading week.

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 ANP1105C will take place during the winter term Reading Week (February 2018) and the regulations regarding illness on exam day indicated in the preceding section 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 supplemental examination fees.

If you register for the supplemental and don't write the exam and you haven't informed your faculty that you will not be present for it one day in advance, you will receive the grade "INC" which is equivalent to a failure.

❖ **Assignments**

The remaining 10% of the grade will be from online assignments on the [Mastering A&P](#) website throughout the term (see below for Mastering A&P schedule) and from assignments on Brightspace (see schedule below). You must have an access code to be able to do the assignments on the Mastering A&P website. The due date for assignments are final and no extensions will be granted so please pay careful attention to the deadline. The excuse of having forgotten the due date or that you were ill will not be accepted as you have an entire week in which to complete assignments.

Brightspace Assignments	Available (always 6 PM)	Due Date (always 10 PM)
[1] Pre course Self-Assessment	Friday, September 8 th	Thursday, September, 14 th
[2] Post Midterm 1 Self-Assessment	Friday, October 13 th	Thursday, October 19 th
[3] Post Midterm 2 Self-Assessment	Tuesday, November 21 st	Monday, November 27 th

Mastering A&P Assignments	Available (always 6 PM)	Due Date (always 10 PM)
[1] Cells and Tissues	Friday, September 15 th	Thursday, September, 21 st
[2] Membrane Transport and the Neuron	Friday, September 22 nd	Thursday, September, 28 th
[3] Muscle	Friday, September 29 th	Thursday, October 5 th
[4] Homeostasis	Tuesday, October 10 th	Monday, October 16 th
[5] Blood	Friday, October 20 th	Thursday, November 2 nd
[6] The Heart	Friday, November 3 rd	Thursday, November 9 th
[7] Blood Vessels	Friday, November 17 th	Thursday, November 23 rd
[8] Lymphatic System & Respiratory Anatomy	Tuesday, November 28 th	Monday, December 4 th
[9] Respiratory Physiology	Monday, December, 4 th	Thursday, December 7 th

All due dates are final. There is a penalty is 2% for each hour late. All assignments are available as study aids until the end of the final exam period. Note that there is also an introductory assignment that is available to everyone but really needs to be done only by those new to Mastering. It ***does not*** count toward your final Mastering score but is a nice introduction to the course and the type of questions you will encounter in the online assignments.

IMPORTANT INFORMATION

Please examine key [deadlines](#) and the [Faculty of Health Sciences](#) regulations on minimum grades required. The Student Academic Success Service (SASS) website (<https://sass.uottawa.ca/en>) is a great resource when looking for all the services available to students. The Faculty of Health Science offers free [Mentors](#) for ANP courses. Mentoring includes help with course material as well as tips on time and stress management and exam preparation tips. Students taking advantage of this free service in the past have been able to raise their mark by at least one letter grade. For additional information about the mentoring program email mentors@mail.health.uOttawa.ca. There are lots of opportunities for help before the exams but nothing after the exams have been completed.

Academic Integrity

Each student in this course is expected to abide by the academic regulations of the University of Ottawa. Any work submitted by a student in this course for academic credit must be the student's own work. You are encouraged to study together and to discuss information and concepts covered in lecture with other students. However, during examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations may result in failure of the exam, and may lead to failure of the course and University disciplinary action. Please examine regulations on [academic fraud](#). The use of cell phones, laptops or any other digital equipment are not permitted during exams.

Lecture Schedule

Tues 11:30 AM – 1:00 PM Fri 1:00 PM to 2:30 PM	SUBJECT	Professor
Sept 8, 12	Course Introduction Structural Organization of the Human Body	Dr. J. Savory Joanne.Savory@uottawa.ca
Sept 15, 19, 22, 26, 29	Cellular Physiology of Nerve and Muscle Homeostasis: Intro to the ANS and Endocrine System	Dr. W. Staines wstaines@uottawa.ca
Oct 3	Begin Homeostasis	Dr. Staines
Oct 6	Midterm 1 (24 % of Final Grade) • Structural Organization of the Human Body • Cellular Physiology of Nerve & Muscle	Dr. J. Savory
October 10	Finish Homeostasis	Dr. Staines
Oct 13, 17, 20	Begin The Cardiovascular System • Blood • The Heart • Blood vessel and Hemodynamics	Dr. Savory
Oct 23- 27	READING WEEK	
Oct 31, Nov 3, 7, 10	Cardiovascular System continued	Dr. Savory
Nov 14	Midterm 2 (24% of Final Grade) • Homeostasis: Intro to the ANS & Endocrine System • Blood • The Heart	Dr. Savory
Nov 17	Finish The Cardiovascular System Begin The Lymphatic System	Dr. Savory
Nov 21	The Lymphatic System	Dr. Savory
Nov 24, 28, Dec 1, 5	The Respiratory System	Dr. Staines
TBD	Final Exam (42 % of Final Grade) • Blood Vessels and Hemodynamics • The Lymphatic System • The Respiratory System • 10-15% of questions from material covered on the two midterms	

Specific Lecture Objectives

1. Structural Organization of the Human Body

- 1.1. Describe the levels of structural organization that make up the human body
 - 1.1.1 *Define: atom, molecule, organelle, cell, tissue, organ, and organ system; give an example of each & localize each in the hierarchy of anatomical structure*
- 1.2. Cells: summarize the major organelles and structures found in body cells
- 1.3. Tissues: describe the different tissues of the human body
 - 1.3.1 *Define tissue and demonstrate how the organization of cells into tissues contributes to overall homeostasis*
 - 1.3.2 *List the 4 primary types of tissues*
 - 1.3.3 *Define epithelial tissue; list 6 functions associated with epithelia*

Assignment #1 (Cells and Tissues) is due Thursday, September 21st

2. Cellular Physiology of Nerve and Muscle

- 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)

Assignment #2 (Membrane Transport & Neuron) is due Thursday, September 28th

- 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

Assignment #3 (Muscle) is due Thursday, October 5th

EXAM #1: Friday, October 6th during class

3. Homeostasis: Introduction to the Autonomic Nervous System and Endocrine System

- 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 #4 (Homeostasis) is due Monday, October 16th

4. Cardiovascular System

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

Assignment #5 (Blood) is due Thursday, November 2nd

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 (The Heart) is due Thursday, November 9th

EXAM #2: Tuesday, 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 three 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). 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 #7 (Blood Vessels) is due Thursday November 23rd

5. The Lymphatic System

- 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

- 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 #7 (Lymphatic System & Respiratory Anatomy) is due Monday December 4th

- 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 #8 (Respiratory Physiology) is due Thursday, December 7th