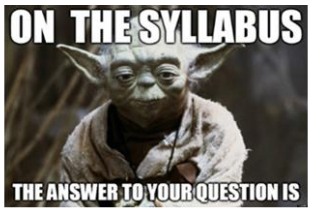
ANP1105B

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

Course Syllabus: September-December, 2021



https://lindaktaylor.com/2018/01/25/a-song-of-syllabi/

Please read this syllabus and keep it handy as a reference as you go through the course. The fact that all of our lectures are online and asynchronous means that you cannot come up to me after class to ask a question. So, the syllabus now has become a truly important resource that contains really everything that you need to know about how this course will work.

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.

There will be three exams throughout the duration of the course, as described below. 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.

All exams will be online exams administered via Brightspace. The midterms will take place during the regularly scheduled lecture time for this course. If you have to miss any exam due to illness, you must notify me by email before the exam begins. In order to have permission to write a deferred exam, you must provide me with medical documentation 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. *The deferred **first** midterm for those with approved medical documentation will take place **on October 27 from 9:00-10:20 AM** and the deferred **second** midterm for those with approved medical documentation will take place **on November 26 from 9:00 to 10:20 AM** The deferred **final** exam will take place during February Reading Week.*

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 ANP1105B will also take place during February Reading Week and the regulations regarding illness on exam day indicated in the preceding paragraph also apply to this exam.

INSTRUCTOR: Dr. J. Carnegie. PhD, M.Ed., (jcarnegi@uottawa.ca)

LECTURES: **Mondays** 16:00-17:20
Wednesdays 14:30-15:50
There will be no live online lectures. Rather, PowerPoint slides will be posted on their own ahead of time so that students can read ahead and prepare. The lectures using those PowerPoint slides will be recorded and students will have access to each recorded lecture in plenty of time to go through it during Monday and Wednesday scheduled lecture times. Please protect these days and times in your calendar for ANP1105.

OFFICE HOURS: **These will be live.** In order to connect more individually with you and help with understanding of course content, I will also use some of your scheduled lecture time for synchronous **virtual office hours**. More information to follow about that on your course web site in Brightspace. I will also add in extra office hour sessions as we approach midterm and final exams.

TEXTBOOK: E.N. Marieb & K. Hoehn: **Human Anatomy & Physiology** (11th edition, 2019) Benjamin Cummings. This textbook and Mastering access code is used for all ANP courses. *You have three options at the University of Ottawa Bookstore, depending on your needs, and you can either pick up in person or have your textbook package sent to you.*

1. Modified Mastering A&P Access Code ONLY (no eText) - $60
2. Hardcover textbook plus modified Mastering A&P Access Code - $202.75
3. Modified Mastering A&P Access Code with eTextbook - $137.75

Please note that there is also a fourth option to purchase the loose-leaf version of the textbook when you are on the Mastering A&P web site. However, you must use a Canadian shipping address for this option. When choosing what to purchase, please note that you will have the access code and eText for 2 years. If you purchase the hardcover textbook, of course you will have that forever.

MASTERING ID You need two items to access Mastering A&P, for course assignments and to use it as a very helpful learning tool. You will need the **access code** that you can purchase at the bookstore and you need the **course ID** that I supply to you so that when you go into Mastering, you are in the right place for OUR course. The Mastering Course ID for ANP1105B is **carnegie87751.**

WEBSITE: Go to university's home page; At the top of the page, select **Student**.

1. On the Students page, select **Brightspace** under **Key Resources**.
2. Enter your username (**student number**) and your **uoZone password**
3. Click "**Login**" and this will bring you to a list of courses for which you have online access.
4. Select **ANP1105B**.

ANSWERS TO FAQS

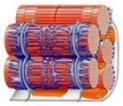
1. **Do I need to purchase the 11th edition of the textbook or is it OK to use the 10th edition or even the 9th edition?**
   It is OK to use the 9th or 10th edition of the textbook. But you will need to purchase an access code for Mastering A & P and when you register with Mastering A & P, you need to indicate that the textbook being used is the 11th edition because that is the textbook I am using!
2. **Do I need to purchase a textbook or can I just study from the lectures?**
   I would strongly recommend purchasing the textbook. You will use the same textbook for all ANP course that you take. While I will base my exam questions on content that I teach to you in the recorded lectures, the textbook is well written, has terrific illustrations, is an excellent resource, and is very helpful in ensuring that you understand the anatomy and physiology that you are learning.
3. **Will the exams be composed entirely of multiple-choice questions (MCQs)?**
   No. While the large size of this class means that most of each exam will be composed of MCQs, I will also ask questions that give you opportunities to write a little to show me your understanding of anatomy and physiology.

Determination of Course Final Grade:

Exam 1 **(Topics 1 & 2)**	Wednesday, October 13th	24% final mark
Exam 2 **(Topic 3 and Topics 4.1 & 4.2)**	Wednesday, November 17th	24% final mark
Mastering A&P Online Homework	Throughout the term	7% final mark
Student Self-Assessment Assignment	See page 5 of syllabus	2% final mark
Jigsaw Puzzle Assignments (new!)	Second half of term; **info to follow**	3% final mark
Final Exam	TBD (Dec. 10-22)	40% final mark
Total		**100%**

1. **Structural Organization of the Human Body** (Sept. 8, 13)
   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

Assignment #1 (Introduction to Mastering A&P) is due Friday, September 24th.
Assignment #2 (Cells and Tissues) is due Friday, September 24th.



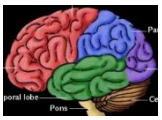
2. **Cellular Physiology of Nerve and Muscle** (Sept. 15, 20, 22, 27, 29, Oct. 4)
   - 2.1. Membrane Transport:
     - 2.1.1. Describe the structure of the plasma membrane
     - 2.1.2. Describe and differentiate among the various types of transport across the plasma membrane
     - 2.1.3. Describe osmosis 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 #3 (Membrane Transport & Neuron) is due Friday, October 1st.

   - 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 #4 (Muscle) is due Tuesday, October 12th.

3. **Homeostasis: Introduction to the Autonomic Nervous and Endocrine Systems** (Oct. 6, 18)



   - 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: Wednesday, October13th online during class time

Assignment #5 (Homeostasis) is due Friday, October 22nd.

4. **Cardiovascular System** (Oct. 18, 20, Nov. 1, 3, 8, 10, 15, 22)

   - **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 an ECG tracing is 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 Tuesday, November 16th.

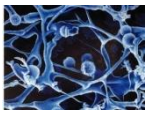
EXAM #2: Wednesday, November 17th online during class time

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).*

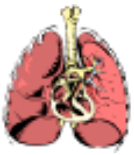
Assignment #7 (Blood Vessels) is due Monday, November 29th.

5. The Lymphatic System (Nov. 24, 29)



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. 29, Dec. 1, 6, 8)



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, December 3rd.

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 10th.

Mastering A&P Assignment Due Dates *(penalty is 2%per hour late, so put these dates in your calendar!): **Use the link to Mastering A&P that is posted in Brightspace**. If you just google Mastering A&P, you may be taken to the **old platform** and **you don't want that**. You will want to bookmark the Brightspace link.*

Assignment Number & Name	Available (always 16:00 h)	Due Date (always 23:00 h)
1. Introduction to Mastering A&P	Wednesday, September 8th	Friday, September 24th
2. Cells and Tissues	Wednesday, September 15th	Friday, September 24th
3. Membrane Transport & the Neuron	Wednesday, September 22nd	Friday, October 1st
4. Muscle	Monday, October 4th	Tuesday, October 12th
5. Homeostasis	Wednesday, October 13th	Friday, October 22nd
6. Blood and the Heart	Wednesday, November 10th	Tuesday, November 16th
7. Blood Vessels	Monday, November 22nd	Monday, November 29th
8.Lymphatic System & Resp. Anatomy	Monday, November 29th	Friday, December 3rd
9.Respiratory Physiology	Monday, December 6th	Friday, December 10th

All assignments are available as study aids until the end of February, 2022.

Student Self-Assessment Assignment (Available on Brightspace)

The first year of university is a huge adjustment for students. Suddenly you find yourself part a huge class where your ability to keep up with the course is not monitored and where the pace of learning has increased significantly. These challenges are even more significant this year because your learning is being done completely online and lectures are asynchronous. The purpose of this two-part assignment is to help you plan your approach to achieving your goals in ANP1105 followed by an opportunity to self-check your level of adherence to your study plans so that you can make adjustments if necessary. You do not require a textbook to complete the assignments. Part 1 is a pre-course assessment and part 2 is a self-check to be completed within two weeks after writing midterm 1. The three components of this assignment and their due dates are listed below.

Assignment #	Assignment Title	Due Date and Time (firm)
1	Self-Assessment Assignment Week 1	Friday, September 17th, 11:00 PM
2	Post Midterm 1 Assessment	Friday, October 29th, 11:00 PM

Instructions for the completion of each assignment are provided on Brightspace with each assignment. Briefly, there is a word document that you download and complete by putting check marks or short responses in the appropriate boxes. You then need to save your completed document as a word file or PDF and submit it within the assignment web page in Brightspace. Please keep your Assignment for Week 1. You will want to refer back to it when completing the post midterm assessments.

Assignments submitted to me by email will be deleted and NOT graded. All assignments MUST be submitted via the Assignment web page in Brightspace.