



Course Number and Title: BIO 121 Anatomy & Physiology II

Campus Location:

Georgetown, Dover, Stanton, Wilmington

Effective Date:

2018-51

Prerequisite:

BIO 120, (CHM 100 or CHM 110 or high school chemistry within 5 years), SSC 100 or concurrent

Co-Requisites:

None

Course Credits and Hours:

5.00 credits

4.00 lecture hours/week

2.00 lab hours/week

Course Description:

This course covers the structure and function of the cardiovascular, respiratory, digestive, urinary, and reproductive systems of humans; metabolism; fluid and acid-base balance; and genetics. Coordinated laboratory experiments are an integral part of this course.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:

Dissection Kit, Disposable Gloves, Lab Coat

Schedule Type:

Classroom Course

Disclaimer:

None

Core Course Performance Objectives (CCPOs):

1. Analyze the structure and functions of the cardiovascular system. (CCC 2, 6)
2. Explain the components and functions of blood. (CCC 2, 6)
3. Analyze the structure and functions of the lymphatic and immune systems. (CCC 2, 6)
4. Explain the structure and functions of the respiratory system. (CCC 2, 6)
5. Describe and identify biochemical classes, and analyze the structure and functions of the digestive system. (CCC 2, 6)
6. Distinguish the basic processes of metabolism and the components of cellular respiration. (CCC 2, 6)
7. Analyze the structure and function of the urinary system and the regulation of body fluid composition. (CCC 2, 6)
8. Analyze the structure and functions of the reproductive system and the female's role in embryonic development (CCC 2, 6)
9. Describe and apply the principles, terminology, and processes of human genetics. (CCC 2, 7)
10. Perform various lab activities related to anatomy and physiology. (CCC 1, 2, 3, 4, 5, 6)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Analyze the structure and functions of the cardiovascular system.
 1. Explain how the cardiovascular and lymphatic systems together form the circulatory system.
 2. Briefly define and interrelate blood, plasma, interstitial fluid, intracellular fluid, lymph.
 3. Describe each of the following: location of the heart, surface anatomy features of the heart, structure, function, and location of the pericardium, epicardium, myocardium, and endocardium.
 4. Identify and describe the structure and function of the chambers, valves, and great vessels of the heart.
 5. Describe coronary circulation.
 6. Trace the path of blood through the heart and great vessels.
 7. Compare the structure and function of arteries, arterioles, capillaries, venules, and veins.
 8. Define collateral circulation and an anastomosis, and give examples.
 9. Describe the pulmonary circulation, and identify its principal arteries and veins.
 10. Describe the systemic circulation and identify its principal arteries and veins.

11. Trace the flow of blood through selected vessels of the human body.
 12. Identify the hepatic portal system, and explain its significance.
 13. Describe the origin of heart beat, the conduction system, and the spread of electrical activity in the heart.
 14. Describe a cardiac cycle, sketch and label an electrocardiograph (EKG), and relate the cycle to heart sounds and pressure changes.
 15. Explain the intrinsic and extrinsic control of the heart rate.
 16. Define cardiac output, and relate the importance of cardiac output, blood volume, and peripheral resistance to blood pressure.
 17. Discuss determinants of peripheral resistance: blood viscosity, vessel length, and vessel diameter.
 18. Describe blood pressure, and differentiate between systolic and diastolic arterial pressure.
 19. Discuss the factors that affect venous return to the heart.
2. Explain the components and functions of blood.
 1. List the physical properties of blood.
 2. List the components of blood, and briefly explain their functions.
 3. Describe the structure and function of the erythrocyte and hemoglobin.
 4. Explain erythropoiesis, and list factors necessary for erythropoiesis.
 5. List the types, structural features, origin, and properties of leukocytes.
 6. Explain the significance of differential white blood cell (WBC) count, and list normal values.
 7. State the structure, origin, and functions of platelets.
 8. Describe hemostasis and clot dissolution.
 9. Explain the ABO and Rh blood groups.
 3. Analyze the structure and functions of the lymphatic and immune systems.
 1. Identify the components of the lymphatic system.
 2. Describe the location, structure, and function of secondary lymphatic organs.
 3. Describe the function of lymph nodes.
 4. Compare the structure and function of lymph capillaries to blood capillaries and to veins.
 5. Trace the lymph circulation from lymph capillaries to the thoracic or right lymphatic duct.
 6. Differentiate between B and T cells.
 7. Differentiate between specific and nonspecific immunity.
 8. Describe nonspecific immune responses.
 9. Define antigen and antibody.
 10. Explain basic antibody structure and antibody-antigen complex formation.
 11. List antibody types and their function.
 12. Distinguish between humoral and cell-mediated specific immunity.
 13. Explain active and passive immunity.
 4. Explain the structure and functions of the respiratory system.
 1. Define respiration.
 2. List the organs of the respiratory system, and divide them into upper and lower respiratory tract.
 3. List the locations and functions of the various types of epithelium that line the respiratory tract.
 4. Describe the structures and functions of the internal and external nose and the three (3) regions of the pharynx, the larynx, and the trachea.
 5. Discuss the role of the epiglottis during swallowing.
 6. Discuss the role of the vocal cords in sound production.
 7. Describe the gross anatomy of the lower respiratory tract.
 8. Define atmospheric, intrapleural, and intrapulmonic pressure.
 9. Describe the process of inspiration and expiration.
 10. Define compliance, and list conditions which affect it.
 11. Explain airway resistance, and list conditions which affect it.
 12. Define and relate perfusion and ventilation.
 13. List the normal male values for the lung capacities and volumes.
 14. Discuss the exchange of gases in the alveoli and blood, including partial pressures of oxygen (O₂) and carbon dioxide (CO₂).
 15. Describe the transport of CO₂, and O₂ by the blood.
 5. Describe the structure and functions of the digestive system.
 1. Describe and identify biochemical classes, and analyze the structure and functions of the digestive system.
 2. Define and classify the biomolecules: carbohydrates, proteins, lipids and give examples of each type
 3. Define nucleic acids and nucleotides.
 4. Define an enzyme and describe the mechanism of enzyme action.
 5. Define digestion.
 6. List the organs of the gastrointestinal (GI) tract and the accessory organs associated with each region.
 7. Describe the structure and function of the layers of the alimentary canal.
 8. Define the peritoneum and its function.
 9. State the location of mesentery, mesocolon, greater omentum, and the falciform ligament.
 10. Describe the structures of the mouth and tongue.
 11. List the salivary glands and tonsils, and state their locations and functions.
 12. Describe the structure of a tooth, and compare permanent and deciduous dentition.
 13. Describe the structure and function of the esophagus, the stomach, the small intestine, the liver, and gallbladder.
 14. Explain how the ducts from the gallbladder, liver, and pancreas connect to the duodenum.
 15. Describe the structure and function of the pancreas as they relate to digestion.
 16. Describe the structure of the large intestine.

17. Describe the processes of chewing, swallowing, peristalsis, and segmental movements.
18. Describe the process of vomiting.
19. List the secretions produced by each region of the GI tract, and list the accessory organs and their functions.
20. Describe the chemical digestion of carbohydrates, lipids, and proteins.
21. Describe the multiple roles of the liver in digestion, detoxification, and carbohydrate metabolism. .
22. Explain how and where the products of digestion are absorbed.
23. List important nutrients synthesized by the colon.
24. Describe feces formation and the defecation reflex.
25. Discuss the nervous and hormonal control of the GI tract.
6. Distinguish the basic processes of metabolism and the components of cellular respiration.
 1. Define metabolism, catabolism, and anabolism.
 2. List the energy sources for metabolism in order of importance to the body.
 3. Explain the metabolism of carbohydrates.
 4. Write the equation for the complete oxidative breakdown of glucose.
 5. Explain the metabolism of protein and lipids.
 6. List the hormones that change the rate of carbohydrate, lipid, and protein metabolism.
 7. State factors influencing metabolic rate.
 8. Explain regulation of body temperature by the hypothalamus.
7. Analyze the structure and functions urinary system and the regulation of body fluid composition.
 1. List the organs of the urinary system and their location.
 2. Describe the external and internal anatomy of the kidney.
 3. Describe the structure of the nephron.
 4. Describe the renal circulation of blood.
 5. Define glomerular filtration rate (GFR).
 6. Compare the composition of the filtrate with that of the plasma.
 7. Describe the reabsorption of glucose, amino acids, water (H₂O), and ions.
 8. Describe the process of tubular secretion and its effect on pH.
 9. Explain how urine concentration is regulated by anti-diuretic hormone (ADH).
 10. Explain the role of the renin–angiotensin pathway, aldosterone, and atrial
 11. natriuretic hormone in regulation of sodium and potassium levels.
 12. Trace the path of urine through the kidney to the ureter.
 13. Describe the structure and function of the ureters and urinary bladder.
 14. Compare and contrast the structure of the urethra in males and females.
 15. Define micturition, and describe the micturition reflex.
 16. List the body's major fluid compartments.
 17. Define electrolytes, and list some of their functions.
 18. Compare the electrolyte composition of the body's fluid compartments.
 19. State the normal pH of blood.
 20. Define acidosis and alkalosis.
 21. Differentiate between respiratory and metabolic acidosis and alkalosis.
 22. Define buffers, name the different buffer systems, and explain how they work in the body.
 23. Describe the roles of the respiratory and renal systems in the control of acid–base balance.
8. Analyze the structure and functions of the reproductive system and the female's role in embryonic development.
 1. Explain why the gonads are mixed glands.
 2. Define gametogenesis, spermatogenesis, and oogenesis.
 3. Describe the structure and function of the scrotum.
 4. Describe the gross structure and histology of the testes.
 5. Explain spermatogenesis.
 6. Explain the influence of the hypothalamus and gonadotropins on testicular function.
 7. Describe the structure and functions of the epididymis and spermatic cord.
 8. Trace the ducts traversed by sperm and their junctions with the accessory glands' ducts.
 9. Define and list the parts of seminal fluid (semen).
 10. Explain the location of the seminal vesicles, prostate gland, and bulbourethral glands and the functions of their secretions.
 11. Explain the gross structure of the penis.
 12. Explain the process of erection and ejaculation.
 13. Describe the location and function of the ovaries.
 14. Explain oogenesis and the development of the corpus luteum.
 15. Explain the influence of the hypothalamus and gonadotropins on ovarian function.
 16. Describe the location, structure, and function of the uterine tubes, the supporting ligaments, and the uterus.
 17. Describe the sequential events of the ovarian and menstrual cycles.
 18. Describe the location, structure, and function of the vagina.
 19. List the structures of the vulva and the female accessory glands and their function.
 20. Define the boundaries of the perineum.
 21. Explain the embryological relationships of the male and female reproductive organs and glands.
 22. Describe the location, structure, and function of the mammary glands.
 23. Discuss the physiological effects of estrogens, progesterone, human chorionic gonadotropin (hCG), relaxin and testosterone.
 24. Describe the changes in the ovum associated with fertilization.

25. Describe embryonic and fetal development.
26. Describe fetal circulation and the changes in the cardiovascular system associated with birth.
9. Describe and apply the principles, terminology, and processes of human genetics.
 1. Describe the structure of deoxyribonucleic acid (DNA) and the significance of complimentary base pairing.
 2. Describe ribonucleic acid (RNA) structure, and name the three different types of RNA.
 3. Describe transcription, translation, and the function of messenger RNA (mRNA) and transfer RNA (tRNA).
 4. Describe the process of meiosis and its significance.
 5. Define haploid and diploid, and relate them to the normal human chromosome number.
 6. Define heredity.
 7. Explain Mendel's principles of inheritance: dominance, segregation, and independent assortment.
 8. Describe the chromosomal theory of inheritance, including chromosome number (diploid, haploid), homologous chromosomes, genes and alleles, genotype and phenotype, recessive alleles, and homozygous and heterozygous alleles.
 9. Describe monohybrid and dihybrid crosses, and give examples of each.
 10. Describe the inheritance of autosomal dominant and recessive traits, and give examples.
 11. Define incomplete dominance and codominance, and give examples.
 12. Explain the inheritance of ABO and Rh blood groups.
 13. Explain the inheritance of sex and sex-linked inheritance.
 14. Define non-disjunction, and explain its significance.
10. Identify anatomy of the cardiovascular, respiratory, digestive, urinary, lymph, and reproductive systems on models, specimens, diagrams and/or computer programs, and dissection in a laboratory situation.
 1. Perform various physiological laboratory activities related to the cardiovascular, respiratory, digestive, and urinary systems, as well as acid base balance.

Evaluation Criteria/Policies:

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	-	100	=	A
83	-	91	=	B
75	-	82	=	C
0	-	74	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):

None

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.