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COURSE NUMBER AND TITLE
BIO202 Anatomy and Physiology II

PREREQUISITES
BIO 103 and BIO 201

DIVISION AND DEPARTMENT
Math and Science Department

SEMESTER HOURS CREDIT
Four hours

CATALOG DESCRIPTION
This course and BIO 201 cover the structure and function of the human body. Topics in BIO 202 include the endocrine, circulatory, respiratory, digestive, excretory, cardiovascular, lymphatic, and reproductive systems. Also included is a study of basic nutrition, and the basic principles of water, electrolyte, and acid-base balance. Dissection, histological studies, and physiology are featured in the laboratory experience. A 120 minute laboratory is required.

TEXTBOOK(S)

TOOLS AND SUPPLIES
Paper
Three ring binder
Latex/ non latex gloves
Safety Goggles
LEARNING OBJECTIVES

The Endocrine System

1. Define an endocrine gland, and list the major endocrine glands of the body and their locations.
2. Define a hormone, and describe the chemical categories of hormones.
3. Explain the relationship of hormones to target cells, and the types of changes that result in target cells in response to hormone stimulation.
4. Describe the second messenger systems used by amino acid-based hormones.
5. Explain the mechanism of intracellular activation used by steroid hormones and thyroid hormone.
6. Examine the factors that determine target cell activation, and compare how the cell uses up-regulation and down-regulation to alter its responsiveness to hormones.
7. Identify the factors that affect circulating hormone concentration, and the differences in the time required for the effects of hormones to be seen in target cells.
8. Underscore the three types of hormone interaction on target cells.
9. Discuss the three types of stimuli that promote or inhibit the release of hormones, and the effect of nervous system modulation.
10. List the hormones produced by the major endocrine organs, the factors controlling their release, and their effects on target cells.
11. Name the hormones produced by other organs of the body, their source, and effects.
12. Indicate the embryonic origins of endocrine glands and the chemical classes of hormones produced by each embryonic tissue.
13. Describe environmental effects on hormone secretion or activity.
14. Explain the age-related changes that occur to endocrine organ structure or secretion.

Blood

1. Describe the components of blood and their relative proportions. Define the blood hematocrit.
2. List the physical characteristics of blood. Indicate the normal volumes for males and females.
3. Discuss the functions of blood.
4. Define blood plasma and list the components and their functions.
5. Indicate the formed elements of the blood, their structure, function, and development.
6. Explain the fate and destruction of erythrocytes.
7. Examine the disorders of too many and too few of each type of formed element.
8. Define hemostasis.
9. Identify the events of platelet plug formation.
10. List the events of the coagulation phase of hemostasis. Differentiate between the intrinsic and extrinsic pathways of prothrombin formation.
11. Explain the mechanism and function of clot retraction and tissue repair.
12. Discuss the factors that limit clot formation.
13. List the reasons for transfusion of whole blood, plasma, and blood volume expanders.
14. Discuss the basis for human blood groups. Identify what factor determines each blood group.
15. Explain the results of a transfusion reaction, and how blood typing is used to avoid such a problem.
16. Indicate how the various types of diagnostic blood tests are used.
17. List the structures involved in formation of fetal blood.
18. Compare fetal and adult hemoglobin.

The Cardiovascular System

1. Describe the size, location, and orientation of the heart.
2. Identify the structures of the pericardium.
3. Define the endocardium, myocardium, and epicardium.
4. Compare the function of the atria and the ventricles, and describe the difference between the function of the right and left ventricles.
5. Discuss the need for coronary circulation, and name the vessels that play a role in it.
6. Indicate the function and location of the atrioventricular valves and aortic and pulmonary valves.
7. Describe the microscopic anatomy and control of cardiac muscle cells, and compare to skeletal muscles cells.
8. Name the energetic requirements of cardiac muscle and how these requirements are met.
9. Describe the structures and activities of the intrinsic conduction system.
10. Draw a typical ECG. Label and define the three phases.
11. Discuss the cardiac cycle in terms of relative pressure in each set of chambers.
12. Explain the normal heart sounds and how the sounds relate to closure of specific valves and systole or diastole of the ventricles.
13. Define cardiac output, stroke volume, and heart rate. Calculate cardiac output and cardiac reserve.
14. List the factors that affect stroke volume of the heart.
15. Describe the effects of the divisions of the autonomic nervous system on the heart.
16. Describe the events of development of the heart from two separate tubes to a finished structure.
17. Explain age-related changes that occur in the heart. Discuss possible changes in heart function due to these changes.

Blood Vessels

1. Define the direction of flow and oxygenation state of blood in arteries and veins.
2. Describe the structural arrangement and composition of the layers of blood vessels.
3. State the function of each type of blood vessel.
4. List the types of capillary endothelium and the functional applications of each.
5. Explain the pathway of blood flow through capillary beds, and the role of precapillary sphincters.
6. Define blood flow, blood pressure, and resistance, and describe the factors that affect each.
7. State the relationship between flow, pressure, and resistance.
8. Discuss systemic blood pressure in terms of pressure gradients and characteristics in each type of vessel.
9. Define systolic and diastolic pressure.
10. Explain the mechanisms used to regulate blood pressure.
11. Define hypertension and hypotension, and identify contributing factors.
12. Explain how blood flow is regulated by the body.
13. Identify the types and causes of circulatory shock.
14. List the major blood vessels of the body and the areas and organs they serve.
15. Describe the major differences between arteries and veins.
16. Explain how the vascular system develops during fetal development.
17. Discuss special structural adaptations of the fetal circulation.
18. Identify the changes that occur in the vascular system as a consequence of age.

The Lymphatic System

1. Describe the function of the lymphatic system.
2. Explain the structure, distribution, and adaptations of the lymph vessels.
3. Identify the different types of lymphoid cells found in the body.
4. Describe lymphoid tissue.
5. Examine the structure and function of the lymph nodes.
6. List the additional lymphoid organs and explain their structure and function.
7. Trace the development of the lymphatic system in the developing fetus, and indicate the structures that are fully formed and functional at birth.

The Respiratory System

1. List the structures and functions of the nose, nasal cavity, and paranasal sinuses.
2. Describe the structures of the pharynx, larynx, and trachea.
3. Explain the structure of the lungs and the vascular and neural networks that supply them.
4. Discuss the relationship of the pleurae to the lungs and thoracic wall, and their functional importance.
5. Define intrapulmonary and intrapleural pressure.
6. Describe pulmonary ventilation and the relationships between pressure and volume changes as they apply to the lungs.
7. Identify the events of quiet and forced inspiration, and passive and forced expiration.
8. Discuss the effects of airway resistance, alveolar surface tension, and lung compliance on pulmonary ventilation.
9. List and define the respiratory volumes and capacities.
10. Distinguish between obstructive and restrictive respiratory disorders, and describe the role of pulmonary function tests in distinguishing between them.
11. Name the nonrespiratory air movements.
12. Define external respiration and pulmonary gas exchange, and describe the factors that affect exchange.
13. Describe how oxygen and carbon dioxide are carried in the blood, and explain the role of hemoglobin.
14. List the neural structures that control respiration, and the factors that affect rate and depth of respiration.
15. Explain the adjustments to respiration that occur in response to exercise and increased altitude.
16. Identify the characteristics of chronic obstructive pulmonary disorders, asthma, tuberculosis, and lung cancer.
17. Describe the events of development and growth of the respiratory system.
18. List the changes that occur in the respiratory system with age.

The Digestive System

1. List the organs of the alimentary canal and the accessory digestive organs.
2. Name and define the six digestive organs to the peritoneum.
3. Explain the relationship of the digestive organs to the peritoneum.
4. Describe the blood supply to the digestive tract.
5. Identify the four layers of the alimentary canal organs.
6. Describe the anatomy of the mouth, lips, cheeks, palate, tongue, salivary glands, teeth, pharynx, and esophagus.
7. Explain the processes of mastication and deglutition.
8. Discuss the gross and microscopic anatomies of the stomach.
9. List and explain the phases of the regulation of the gastric secretion.
10. Describe the gross and microscopic anatomies of the small intestine.
11. Define the roles of the liver, gall bladder, and pancreas in digestion.
12. Discuss the motility of the small intestine and its requirements for optimal activity.
13. Explain the gross and microscopic anatomies of the large intestine.
14. Describe defecation and the motility of the large intestine.
15. Explain the processes that occur during fetal development of the digestive tract.
16. Underscore the changes in the digestive system that occur with age.

Nutrition

1. Define a nutrient and list the six major nutrients of the body.
2. Discuss the dietary sources, uses in the body, and dietary requirements for carbohydrates, lipids, proteins, vitamins, and minerals.
3. Describe the difference between fat-soluble and water-soluble vitamins and the role of antioxidants.
5. Discuss the catabolic and anabolic steady state of the body.
6. Explain the absorptive and postabsorptive states.
7. Discuss the metabolic roles of the liver.
8. Discuss the regulation of food intake and its theories.
9. Describe the body’s metabolic rate, basal metabolic rate, and total metabolic rate.
10. Discuss the consequences of poor nutrition in both the developing embryo and the elderly.

The Urinary System

1. Describe the anatomy of the kidney and its placement in the body.
2. List the regions of the kidney and the structures found within each region.
3. Trace the vascular pathway through the kidney.
4. Name the structures and functions of the nephron and its elements.
5. List the steps of urine formation.
6. Explain glomerular filtration and the mechanisms that control its pressure and rate.
7. Define tubular reabsorption; list the solutes that are reabsorbed and the mechanisms used to reclaim them from the filtrate.
8. Discuss the differences in solute reabsorption in each portion of the nephron tubules.
9. Explain tubular secretion, and list the solutes that are secreted.
10. Describe the countercurrent mechanism regulating urine concentration and volume.
11. Identify the roles of antidiuretic hormone and aldosterone in water and sodium reabsorption.
12. List the physical characteristics of urine and indicate its chemical composition.
13. Describe the anatomy of the ureters.
14. Explain the structure, location, and capacity of the urinary bladder.
15. Identify the general location, structure, and function of the urethra and compare the male and female urethras.
16. Define micturition and the events controlling it.
17. Explain the developmental events of the fetal urinary system.
18. Discuss the changes in control of micturition that occur during childhood.
19. List the age-related changes that occur in the urinary system.

Fluid, Electrolyte, and Acid-Base Balance
1. Identify the routes of water intake and output to and from the body.
2. Explain the thirst mechanism and mechanism of cessation of thirst.
3. Indicate how shifts in water output by the body occur, and how the body compensates for such shifts.
4. Discuss the activity of antidiuretic hormone.
5. Describe the imbalances of fluid homeostasis and their consequences.
6. Explain how salt is balanced in the body.
7. Describe how sodium regulates fluid and electrolyte balance.
8. Identify the mechanisms regulating sodium balance of the body fluids.
9. Examine the mechanisms regulating potassium, calcium, and phosphate balance of the body fluids.
10. Discuss the mechanism regulating anions in the body fluids.
11. Define acidosis and alkalosis, and describe the sources of hydrogen ions and how their concentration is regulated.
12. Describe the components and activity of chemical buffer systems.
13. Explain the mechanisms of the bicarbonate, phosphate, and protein buffer systems.
14. Discuss how the respiratory and renal systems regulate pH.
15. Differentiate between respiratory and metabolic acidosis and alkalosis.
16. Describe changes in the body water content and regulation during fetal development and throughout life.

The Reproductive System
1. Explain the structure and function of the testes.
2. Describe the structure and function of the penis.
3. List and discuss the location, structure, and function of the male accessory ducts and glands.
4. Define the male sexual response.
5. Describe the process of spermatogenesis.
6. Identify the hormonal regulation of the male reproductive function.
7. Name the male secondary sex characteristics and explain the role of testosterone in their formation.
8. Indicate the structure, function, and location of the female reproductive duct system.
9. Describe the structure, function, and location of the female reproductive duct system.
10. Identify the structures of the female external genitalia.
11. Discuss the mammary glands and breast cancer.
12. Explain the process of oogenesis.
13. Discuss the ovarian cycle including its three phases and their major events.
14. Indicate the hormonal interactions of the ovarian cycle.
15. Describe the uterine cycle.
16. Identify the effects of estrogen and progesterone on the development of structures and physiological processes other than the ovarian cycle.

Schedule
The Endocrine System
Blood
Exam I

The Cardiovascular System
The Blood Vessels
Exam II

The Lymphatic System
The Respiratory System
Exam III

The Digestive System
Nutrition
Exam IV

The Urinary System
Fluid, Electrolyte, and Acid-Base Balance
Exam V

The Reproductive System

TEACHING METHODS
A variety of teaching methods and student involvement exercises will be utilized to address different learning styles. Active learning methods will be utilized. Examples of Active Learning used in Bio 202 are: Reading quizzes, Think-Pair-share, Note comparison, Cooperative groups.

ATTENDANCE POLICY
Class attendance is regarded as an obligation as well as a privilege. Absences seriously disrupt a student’s orderly progress in a course, and significantly diminish the quality of group interaction in class. There is also a high correlation between the number of absences and the final grade. **Attendance is very important to passing this class.** All students are still responsible for preparing all assignments for the next class and for completing work missed...

Students are expected to attend all classes for which they are registered. Students who are unable to attend class regularly, regardless of the reason or circumstance, should withdraw from that class before poor attendance interferes with the student’s ability to achieve the objectives required in the course.

Tracking of student activity and performance will be conducted approximately every two weeks.

CLASS POLICY
Students will not be allowed to leave the classroom and return during a test. It is very disruptive to students taking a test for someone to walk in late. Please be on time.

**No cell phones. Please turn off your cell phones before you enter class.**

**Food and drinks are not allowed in the laboratory for health reasons.**

Students are to conduct themselves as adult learners. This means to be punctual and courteous in all interpersonal relationships. Students are to be in the classroom and ready for roll call when the instructor arrives.
Some of the material discussed in the classroom is personal and confidential and all opinions are to be treated with respect. Do not discuss information in the cafeteria or other public places where you may be heard. This is a part of your professional training.

Lab stations may be assigned. If the station is left in a disorderly fashion or abused in any manner, points will be deducted from your grade.

**WITHDRAWAL**
A student may withdraw from a course or all courses without a grade penalty up to fourteen (14) days prior to the first day of final exams for the fall and spring terms. For the summer term, students may withdraw from classes up to seven (7) days prior to the first day of final exams for each session. The final date for official withdrawal is printed in the college calendar and published in each class schedule. A student who receives Title IV Federal Financial Aid (ex. Pell Grant) may have to repay funds if he/she withdraws prior to completing 60 percent of the semester. See the Director of Financial Aid for more specific information.

I hope that you will put forth the effort to stay in class and pass. It is my responsibility to teach, but it is your responsibility to come to class and learn. If for some reason you feel that you are unable to pass the class and wish to drop out of the class, please take the necessary steps to withdraw. If you do not withdraw, your grade could be an F. That F will follow you all of your life and lower your GPA. The F could affect your ability to enter into a program later and prevent you from receiving financial aid. Check the College catalog for withdrawal dates.

**EVALUATION PROCEDURES FOR STUDENTS**

**Exams**
All students are expected to take the test on the scheduled date. The **instructor must be notified prior to the test time that the exam will be missed in order to have the privilege of a make up test**. Make up exams can be multiple choice, essay, fill in the blank, short answer, true/false or a combination. The make up exam must be taken before the next scheduled exam. Bonus points or activity points will not be applied to make ups.

**Laboratory Assignments**
Labs **cannot** be made up. It is of your best interest to be in class in order to complete your labs. Assignments will also include group/individual projects. One lab grade will be dropped at the end of the course. If you miss a lab, that becomes your dropped grade.

**Quizzes**
There may be announced/unannounced quizzes from material lecture material or a previous lab experience. Lecture quizzes **cannot** be made up. One lecture quiz can be dropped at the end of the semester. If you missed a lecture quiz, that will be the dropped grade.

**Grading Policy**
- 6 Exams @ 100 pts. each.................................................................50%
- 10 Lab Assignments/projects/class quizzes........................................25%
- Quizzes/Outside Assignments..........................................................15%
- Class Participation........................................................................10%
- Total..........................................................................................100%

**Grading Scale:**
The college grading scale will be used. It is as follows:
- 100 - 90..........A
- 89 - 80............B
- 79 - 70..........C
- 69 - 60..........D
- 0 - 59............F

This is the standard college grading scale for general study classes. If you are enrolled in or plan to transfer to a program that requires a higher numerical grade for a “C”, then you should get that information from your program director.
MAKE-UP POLICY
The make up policy for each evaluation procedure is listed above.

LATE WORK
Unless previous arrangements have been made with the instructor because of an emergency, any late work will result in a loss of 50% of the possible grade.

ACADEMIC HONESTY
Students are expected to follow the Student Code of Conduct as described in the current college catalog (pages 157-159). Cheating and plagiarism violate these standards and may result in disciplinary action, including expulsion.

All students are expected to do their own work. If caught cheating on a quiz, exam or practical, the violating student will get a zero on the assignment. Collaboration is acceptable in lab activities. However, students are required to answer the written questions in their own words. If a student is caught copying another student’s lab sheet or review questions, both students will receive a zero on the assignment.

INCOMPLETE (I) GRADE POLICY
A grade of Incomplete (I) may be assigned when the quality of work has been passing but the student has been prevented by illness or other justifiable cause from completing the required work or taking the final examinations. A student who must miss a final examination has the responsibility of notifying the instructor prior to the examination or as soon thereafter as possible and of furnishing acceptable evidence concerning the cause of the absence upon return. If the cause is personal illness, the student should present the instructor a statement signed by the appropriate health care professional.

A grade of Incomplete (I) must be cleared two weeks before the last class day of the following term or the grade automatically becomes an “F.” It is the student’s responsibility to contact the instructor and to make up missed course assignments and/or examinations.

POLICY ON REASONABLE ACCOMMODATIONS FOR PEOPLE WITH DISABILITIES
Lurleen B. Wallace Community College complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. If you have a disability that might require special materials, services, or assistance, or if you have any questions relating to accessibility, please contact the ADA Coordinator on the respective campuses. For TDD users in Alabama, the Alabama Relay Center is available by calling 1-800-548-2546. All materials related to compliance with the Americans with Disabilities Act are maintained by the college coordinators.

Andalusia Campus Bridges Anderson Greenville Campus Dr. Jean Thompson MacArthur Campus Jason Cain 334-881-2247 334-382-2133 ext. 3102 334-493-3573 ext. 5363

SAFETY GUIDELINES
Experiments in Biology laboratories sometimes involve working with potentially dangerous chemicals, specimens, cultures, and expensive equipment that must be used properly. To ensure your personal safety and the safety of those around you, follow these rules:

1. It is mandatory for your safety and the safety of others that you read the laboratory exercise before you come to the lab so you are familiar with the procedures you will perform. Think
about what you are doing at all times and ask your instructor about any part of the exercise that
is not clear.
2. Do only the lab exercise specified by the instructor during the designated lab period. Additional
lab experiments or make-up work may be done only with the instructor’s approval.
3. Upon entering the laboratory, locate the safety equipment, i.e. exits, fire extinguisher, fire
blanket, chemical shower, eyewash station, first aid kit, and broken glass container. Be familiar
with the emergency procedure as reviewed by your instructor and posted.
4. Never eat, drink, apply cosmetics, or touch contact lenses in the laboratory. Smoking is not
permitted in any building on this campus.
5. Restrain hair, loose clothing, and dangling jewelry.
6. Wear safety glasses when using solutions or chemicals, or when directed to do so by your
instructor.
7. Some chemicals may damage your clothes. Wear appropriate clothing or bring an apron or lab
coat to protect your clothing.
8. Keep all materials away from the edge of the workbench to avoid spills.
9. Report all accidents or spills, no matter how minor, to the instructor as soon as they occur.
Spilled reagents must be cleaned up immediately. Seek assistance from the instructor to ensure
that spills are cleaned up in an appropriate manner.
10. Keep open flames away from flammable chemicals or materials and yourself. Do not leave heat
sources unattended.
11. Test tubes and flasks, in which a reaction is taking place, should be pointed away from yourself or
anyone else.
12. Do not inhale or taste any substances in the lab.
13. Clean or decontaminate work surfaces and/or equipment used at the end of every lab period,
using the cleaning procedure and agent specified by your instructor.
14. Wear disposable gloves when handling preserved materials. Wash hands immediately after
removing gloves. Wash all dissecting instruments in disinfectant.
15. Dispose of all materials such as cultures, gloves, swabs, contaminated paper toweling, and
toothpicks as instructed. Many laboratory materials cannot be thrown in the garbage or poured
down the sink.
16. All equipment, supplies, and chemical reagents are to be returned to their original locations at
the end of the laboratory procedure.
17. Under no circumstances are lab materials, models, cultures or specimens to be removed from
the laboratory.

OTHER
Additional course information may be announced by the instructor, and the instructor may make changes to this
syllabus.