Course: Human Anatomy and Physiology II /BIO 212

Credits: 4 hrs. credit (3 hours of lectures and 3 hours of lab each week)

Texts: ***Fundamentals of Anatomy and Physiology***, Frederic H. Martini, 9th edition, Prentice Hall Publisher.

Pictorial Anatomy of the Cat, by Stephen Gilbert, University of Washington Press, 1999.

Other Required Materials: Dissecting kit, disposable non-latex gloves, lab coat & safety goggles.

Description of the Course:

a) Catalogue Description: A continuation of BIO 211, Human A&P I. The following systems will be covered: endocrine, digestive including nutrition, circulatory, lymphatic, respiratory, urinary including fluids and electrolytes, and reproductive. Human development and topics in human genetics will also be covered. Prerequisite(s): BIO 211 Human A&P I with a C- grade or higher. This is a two-semester course in order to receive knowledge of all of the systems of the human body, students are obligated to complete both semesters of Human Anatomy & Physiology.

b) General Course Objectives:

1) To aid the student in developing an understanding of the life processes as related to humans.

2) To aid the student in developing an understanding of the normal structures and functions of the human body.

3) To provide a useful body of knowledge for studying biology, nursing and other allied health science areas.

Class Attendance Policy:

Attendance of all class activities in lecture and laboratory is required. Absences are counted from the first meeting of class. More than four consecutive or more than six accumulative absences could result in student receiving a "F" grade in this course. An explanation of the cause of all absences should be given to your instructor.

Academic and Classroom Misconduct:

The instructor has primary responsibility for control over classroom and/or laboratory behavior and maintenance of academic integrity, and can request the temporary removal or exclusion from the classroom or laboratory of any student engaged in conduct that violated the general rules and regulations of the institution. Or any student engaged in conduct deemed hazardous in the laboratory. Extended or permanent exclusion from lecture or laboratory activities or further disciplinary action can only be effected through appropriate procedures of the institution.

Plagiarism, cheating on quizzes or tests, or any form of academic dishonesty is strictly prohibited. Students guilty of academic dishonesty directly or indirectly will receive a zero for the exercise or quiz or test and may receive a "F" grade for the course in addition to other possible disciplinary sanctions with may be imposed through the regular institutional procedures. Any student that believes that he or she has been erroneously accused may appeal the case through the appropriated institutional procedure if their grade was affected.

Procedure for Dropping the Course: ***College's Withdrawal Policy***

Any student who finds it necessary to discontinue this course MUST complete a withdrawal from in the Registrar's Office at the time of the withdrawal. If you can not withdraw in person, you may call the Registrar's Office and provide them with the appropriate information. Verbal withdrawals are not acceptable. Students may withdraw from the course at any time during the first fourteen weeks of instruction (deadline date will be announced or published). Student who do not officially withdraw but stop attending class will be assigned an"F" grade for the course. **Once a student withdraws for class he/she is no longer eligible to take any remaining quizzes or test.**

Tests:

There will be nine scheduled quizzes (additional pop quizzes may also be given); all quizzes are given during the first ten minutes of class. (No make-ups for quizzes). Three unit tests, three lab tests and a comprehensive final exam will also be given. Unit tests are scheduled in advance and will be reviewed before the final exam is given. If a student checks out the unit tests in order to prepare for the final, all unit tests MUST be returned to the instructor before the final exam can be taken.

Grade Determination:

½ of the semester's average, ¼ of the lab grade, ¼ of the score on the comprehensive final exam will determine the final course grade.

EXAMPLE:

(Semester's Average)	-	½	(90)	=	45
(Lab Grade)	-	¼	(92)	=	23
(Final Exam Score)	-	¼	(96)	=	24
					92

The best seven quiz scores will be added together and divided by seven to determine the quiz average. The quiz average and the three unit tests scores will be added together and divided by four to determine the semester's average. The lab grade will be determined by averaging the three lab test scores. The comprehensive final exam consists of two hundred questions x 0.5 points, total possible points of 100.

Grade Scale: There will be NO grading on the normal distribution curve.

100.00 – 94.50 = A
94.49 – 90.00 = A-
89.99 – 87.50 = B+
87.49 – 84.50 = B
84.49 – 79.50 = B-
79.49 – 77.50 = C+
77.49 – 74.50 = C
74.49 – 69.50 = C-
69.49 – 63.50 = D+
63.49 – 59.50 = D
59.49 – 55.00 = D-
54.99 – 00.00 = F

Exemption Policy:
The instructor will determine who is to be exempted from taking the final exam, not the student. Exemption is an earned privilege not an inherited right. Any student that is exempted from taking the final exam will be notified in writing. Students being considered for exemption MUST meet all of the following requirements: (No exceptions for any reason!)

1) Good classroom conduct.
2) Only 1 absence from lecture or laboratory (excused or non-excused)
3) No more than two tardies during course of semester in lecture or laboratory.
4) All unit tests and lab tests must be taken when scheduled (no make-ups).
5) No test score, (lecture or laboratory), lower than 88.
6) The average of the best seven quizzes cannot be lower than 90.
7) Must have an overall semester's average of 95 or higher. (No rounding off).
8) Must have a semester's lab grade of 95 or higher. (No rounding off).
9) Intangibles.

Make-ups:
Any assignment missed can be obtained from the instructor. Lab work may be made up during free time within a week of the missed assignment if the lab is available. Quizzes, scheduled or pop, cannot be made up for any reason. Unit tests can only be made up by special arrangement with the instructor. Makeup tests will be granted on an individual basis only following a conference with the instructor; where the reason(s) for missing the test must be determined mitigating circumstances beyond the control of the student such as, illness, death in the family, or change in condition of employment. All make-up tests will be scheduled during the week of the final exams. If two unit tests are missed during the semester and/or if the final exam is missed the student will receive a "F" grade if he or she is failing other parts of the course or an "I" if the student is passing all other parts of the course.

Revisions to the Syllabus:

Students are responsible for learning all of the objectives and all of the items in the course outline whether they are discussed in lecture and/or laboratory or not. The instructor reserves the right to revise the objectives, topical outline, or academic schedule contained in this syllabus without notice. However, if the revisions affects scheduled unit test a 48 hour notice will be given for the new test date.

Cellular phones and beepers:

Cellular phones and beepers are only allowed in class or lab if they are turned off or in silent mode. Under no circumstance are phones to be answered in class. When there are extenuating circumstances that require that a student be available by phone or beeper, that student must speak to the instructor prior to class, so that together they can arrive at an agreement.

Course Outcomes: Human and Anatomy and Physiology II

1. The student will be able to compare the physiology of the endocrine system and the nervous systems using practical examples and/or practical applications.
2. The student will be able to compare the cellular components of the endocrine system with those of other tissues and systems and describe how endocrine organs are controlled.
3. The student will be able to compare the major chemical classes of hormones and describe the chemical composition of each class of hormones.
4. The student will be able to explain in detail the general mechanisms of hormonal action.
5. The student will be able to explain how hormones interact to produce coordinated physiological response.
6. The student will be able to name the major endocrine glands of the body describe their location in the body and the hormones they secrete.
7. The student will be able to identify the hormones that are especially important to normal growth, and discuss their roles.
8. The student will be able to explain the action of the hormones secreted by the various endocrine glands of the body.
9. The student will be able to discuss and give examples of both positive and negative feedback mechanisms.
10. The student will be able to describe the interrelationship of neural and hormonal control.
11. The student will be able to discuss the consequences of oversecretion and undersecretion of various hormones.
12. The student will be able to describe the effects that hormones have on behavior.
13. The student will be able to distinguish between physical and psychological stress.
14. The student will be able to describe the general stress response.
15. The student will be able to name the organs of the digestive system and give their location in the body.
16. The student will be able to describe the structure of the wall of the alimentary canal (G.I. Tract).
17. The student will be able to demonstrate knowledge of regulatory control of the nervous and endocrine systems over the alimentary canal (G.I. Tract).
18. The student will be able to describe the mixing and movements of material through the alimentary canal (G.I. Tract).
19. The student will demonstrate knowledge of the swallowing mechanism.
20. The student will demonstrate knowledge of the phases and the regulation of gastric secretion.
21. The student will demonstrate knowledge of the organs of digestion in the mouth and their role in the digestive process.
22. The student will be able to name, give the location and function of the salivary glands.
23. The student will be able to give the structural make-up and the functions of the pharynx and esophagus.
24. The student will demonstrate knowledge of the structural organization and the function of the stomach.
25. The student will demonstrate knowledge of the structure and function of the small and large intestines.
26. The student will demonstrate knowledge of the structure and function of the pancreas.
27. The student will demonstrate knowledge of the structure and function of the liver.
28. The student will be able to list the enzymes secreted by the various digestive glands or organs and describe the function of each.
29. The student will demonstrate knowledge of the hydrolysis of carbohydrates, neutral fats, and proteins.
30. The student will be able to explain how the products of digestion are absorbed.
31. The student will acquire knowledge of some common disorders of the digestive system.
32. The student will be able to define and explain: nutrition, nutrients, and essential nutrients.
33. The student will demonstrate knowledge of the basic food groups and their major sources.

34. The student will be able to explain how carbohydrates, lipids, proteins, and amino acids are utilized by the cells.
35. The student will be able to name the major vitamins needed by the body, give their chemical make up and describe the general function of each.
36. The student will be able to explain the consequences of vitamin deficiencies.
37. The student will be able to name and describe the general functions of the major minerals and trace elements essential to man.
38. The student will demonstrate knowledge of basic metabolism and temperature regulation.
39. The student will demonstrate knowledge of the composition and functions of the blood.
40. The student will be able to distinguish between the various types of cells found in blood.
41. The student will be able to list the major components of blood plasma and give their functions.
42. The student will be able to explain the formation of blood cells and how it is controlled.
43. The student will demonstrate knowledge of the clotting mechanism of blood.
44. The student will be able to explain the basis for blood typing and the methods used to avoid adverse reaction following blood transfusion.
45. The student will be able to describe how blood reaction may occur between fetal and maternal tissues and how such reaction can be prevented.
46. The student will demonstrate knowledge of the heart and blood vessels both structurally and functionally.
47. The student will be able to describe the cardiac conduction system.
48. The student will demonstrate knowledge of the cardiac cycle and the ECG.
49. The student will demonstrate knowledge of the regulation of heart function and blood pressure.
50. The student will demonstrate knowledge of the division of the circulatory system (circulatory circuits).
51. The student will be able to identify and describe the location of the major arteries and veins of the human body in both the pulmonary and systemic circuits.
52. The student will demonstrate knowledge of both hepatic and renal portal systems of circulation.
53. The student will demonstrate knowledge of fetal circulation.
54. The student will be able to define cardiac arrhythmia and describe several forms for arrhythmia.
55. The student will demonstrate knowledge of some disorders of the blood/cardiovascular system.
56. The student will demonstrate knowledge of the structure and function of the lymphatic vessels, nodes, and associated organs.
57. The student will demonstrate knowledge of the composition and circulation of lymphatic fluid.
58. The student will be able to distinguish between specific and nonspecific body defenses and provide an example for each.
59. The student will be able to demonstrate and/or explain how lymphocytes are formed and their role in the immune mechanisms.
60. The student will be able to name the major types of immunoglobulins and discuss their functions.
61. The student will be able to distinguish between primary and secondary immune responses as well as active and passive immunity.
62. The student will be able to explain how allergic reactions and tissue rejection reaction are related to the immune response.
63. The student will demonstrate knowledge of the structure and function of the organs of the respiratory systems and air passageways.
64. The student will demonstrate knowledge of the respiratory musculature and pressure changes produced by their action.
65. The student will demonstrate knowledge of physical and chemical changes associated with oxygen and carbon dioxide transport.
66. The student will demonstrate knowledge of the respiratory volumes and exchanges.
67. The student will demonstrate knowledge of the phases of the respiratory process.

68. The student will review the major events that occur during cellular respiration and explain how oxygen is utilized by cells.
69. The student will demonstrate knowledge of the mechanisms of regulation the respiratory system.
70. The student will demonstrate knowledge of some common physiological modification of the respiratory process.
71. The student will become familiar with some common respiratory disorders and their effect on the respiratory process.
72. The student will demonstrate knowledge of the structure, location, and functions of the kidneys.
73. The student will demonstrate knowledge of the structures, locations, and functions of the ureters, the bladder, and the urethra.
74. The student will be able to trace the pathway of blood through the renal portal system.
75. The student will demonstrate knowledge of the kidney tissues.
76. The student will be able to describe the nephron and explain the functions of its parts.
77. The student will demonstrate knowledge of the physiology of urine formation.
78. The student will be able to explain glomerular filtration and describe the composition of the filtrate.
79. The student will be able to discuss the composition of urine.
80. The student will demonstrate knowledge of the regulation of kidney functions.
81. The student will be able to discuss the process of micturition and explain how it is controlled.
82. The student will be able to describe the distribution of body fluids into the major fluid compartments.
83. The student will be able to explain what is meant by water and electrolyte balance and discuss why it is important.
84. The student will demonstrate knowledge of the mechanisms controlling the distribution of the body's water.
85. The student will demonstrate knowledge of the mechanisms of ionic homeostasis (electrolyte homeostasis).
86. The student will demonstrate knowledge of the relationship between trauma and water distribution.
87. The student will be able to explain factors leading to water intoxication and dehydration and their effects on the water/electrolyte balance.
88. The student will be able to explain or define edema and list several causes and their effects.
89. The student will be able to understand and describe the consequences of sodium and potassium imbalance as well as imbalances in various other electrolytes in the human body.
90. The student will be able to define pH and describe the major sources of hydrogen ions.
91. The student will demonstrate knowledge of the acid-base balance and buffer system.
92. The student will be able to explain acidosis and alkalosis, conditions that cause them to occur and how they may be controlled.
93. The student will be able to state the general function of the reproductive system.
94. The student will be able to describe the process of gametogenesis (spermatogenesis and oogenesis).
95. The student will be able to describe the structure, location and function of the female reproductive anatomy.
96. The student will be able to describe the structure, location and function of the female reproductive anatomy.
97. The student will be able to describe how hormones control the activities of the female reproductive system and how they are related to the development of the female secondary sexual characteristics.
98. The student will be able to describe how hormones control the activities of the female reproductive system and how they are related to the development of the female secondary sexual characteristics.
99. The student will be able to describe the physiological changes relative to the menstrual cycle.
100. The student will be able to discuss the structure and function of the mammary glands.
101. The student will be able to explain fertilization and early embryonic development.

102. The student will be able to explain the physiological and anatomical changes experienced during pregnancy and the birth process.
103. The student will be able to discuss some common methods of contraception.
104. The student will be able to distinguish between growth and development.
105. The student will be able to describe the major events that occur during the period of cleavage.
106. The student will be able to explain how the primary germ layers originate and list the structures produced by each layer.
107. The student will be able to describe the formation and function of the placenta.
108. The student will be able to list and give the functions of the extra-embryonic membranes.
109. The student will be able to define the term fetus and discuss fetal development.
110. The student will be able to trace the general path of blood through the fetal circulatory system.
111. The student will demonstrate knowledge of the Mandolin Laws of the Genetics.
112. The student will demonstrate knowledge of the various forms of gene interaction.
113. The student will be able to describe how chromosomes control the inheritance of sex.
114. The student will be able to describe the patterns of sex-linked traits.
115. The student will be able to define nondisjuction of chromosomes and explain the genetic and/or developmental consequences.
116. The student will be able to discuss some common forms of human genetic diseases.
117. The student will be able to explain the role of DNA and RNA in inheritance.

Course Outline: Human Anatomy and Physiology II

UNIT I

1. The Endocrine System
   - A) Hormones
     1) Chemistry of hormones
        a) amines
        b) proteins
        c) steroids
     2) Action of hormones – the effect they have on organs, tissues, and cells.
     3) Control of hormonal secretions
        a) nerve control
        b) negative feedback mechanism
        c) positive feedback mechanism
   - B) The Glands and Tissues
     1) Pituitary, Pineal gland, Thyroid, Parathyroids, Thymus, Adrenal cortex, Adrenal medulla, Pancreas, Ovaries, Testes, Kidneys, Heart, and other specific tissues.
     2) Anatomical locations of each gland or tissues
     3) Histological features of each gland
     4) Hormonal secretions and their functions of each gland or tissue
     5) Disorders of over and under secretions of each gland or tissue
   - C) Stress
     1) Types
     2) Causes
     3) Responses
     4) Clinical implications

2) The Digestive System
   - A) Regulation of the gastrointestinal system
     1) nerves
     2) hormones
   - B) The wall structure of the alimentary canal (G.I. system)
     1) Mucous membrane
     2) Submucosa
     3) Muscular layer
     4) Serous layer
   - C) The mixing and movement of materials along the G.I. tract
     1) Peristalsis
   - D) The organs and glands of the digestive system their structural make-up, functions, and their anatomical locations.
     1) Mouth
        a) cheeks and lips
        b) tongue
        c) palate
        d) teeth
     2) The salivary glands
        a) parotids
        b) submaxillary
        c) sublingual

3) The pharynx
4) The esophagus
5) The stomach
    a) cardiac region
    b) fundic region
    c) the body
    d) pyloric region
    e) gastric glands
6) The pancreas
7) The liver
8) The small intestines
    a) duodenum
    b) jejunum
    c) ileum
    d) villi
    e) lumen
    f) intestinal glands
9) The large intestines
    a) ascending colon
    b) transverse colon
    c) descending colon
    d) rectum
    e) anal canal
    f) anus

2. Nutrition and Metabolism

A) The basic food groups and their biological usage
    1) carbohydrates
    2) lipids
    3) proteins

B) Energy requirements
    1) basal metabolic rate

C) Vitamins
    1) kinds of vitamins and their chemical composition
    2) sources
    3) biological role
    4) disorders of vitamin deficiency

D) Minerals
    1) essential minerals (elements)
    2) trace elements
    3) biological role of minerals

E) Cellular Respiration
    1) glycolysis
    2) kreb's cycle or tca cycle
    3) electron transport or oxidative phosphorylation

UNIT II

1. The Blood/Cardiovascular System
   - A) The blood
     1) Composition
        a) plasma
        b) formed elements: erythrocytes (red blood cells)
           leukocytes (white blood cells)
           thrombocytes (platelets)
        c) intrinsic factors
     2) The formation of blood cells
     3) Functions of blood cells
     4) Clotting – and the mechanism of clotting
     5) Typing
        a) the ABO system
        b) the Rh system
   - B) The cardiovascular system
     1) The heart
        a) histological features
        b) anatomical features
        c) conduction system
        d) the cardiac cycle and its regulation
        e) arrhythmias
     2) the blood vessels, their anatomy and physiology
        a) arteries/arterioles
        b) capillaries
        c) veins/ venules
     3) Blood pressure
        a) systolic pressure
        b) diastolic pressure
        c) stroke volume
        d) cardiac output
        e) blood volume
        f) control of blood pressure
        g) factors affecting blood pressure
   - C) The circulatory circuits
     1) pulmonary
     2) systemic
     3) coronary
     4) portals (hepatic/renal)
   - D) Fetal circulation
   - E) Disorders of the cardiovascular system
2. Body Defense and the lymphatic system
   - A) The lymphatic system
     1) The basic functions of the lymphatic system
        a) conservation of proteins
        b) absorption of fats
        c) immunity

2) Lymph
   a) composition
   b) circulation
3) Lymph vessels – structure and function
   a) lymphatic capillaries (lacteals)
   b) lymphatic vessels
   c) lymph nodes (afferent and efferent vessels)
   d) lymphatic trunks
   e) collecting ducts
4) Lymphatic organs -structure and function
   a) nodes
   b) spleen
   c) thymus
   d) tonsils

B) Body defense against infections
1) Nonspecific resistance
   a) species resistance
   b) mechanical barriers
   c) chemical action
   d) interferons
   e) inflammation
   f) phagocytosis
   g) fever
   h) NK cells
2) Immunity
   a) lymphocytes
      1) T-cell system
      2) B-cell system
   b) immunoglobulins, their chemical composition, role in immunity and concentration in the plasma
      1) IgG
      2) IgA
      3) IgM
      4) IgD
      5) IgE
3) Types of Immunity
      a) active immunity
      b) passive immunity
4) Allergies and other disorders of the immune system

3. The Respiratory System

A) The organs and passageways of the respiratory system, their structure and functions.
1) nose and nasal cavity
2) pharynx
3) larynx
4) trachea
5) bronchi and bronchioles
6) alveolar ducts and alveoli
7) lungs

B) The mechanism of breathing
   1) inspiration
   2) expiration
C) Respiratory volumes
   1) vital capacity
   2) tidal volume
   3) inspiratory reserve volume
   4) expiratory reserve volume
   5) residual volume
   6) total lung capacity
D) The phases of the respiratory process
   1) breathing
   2) external respiration
   3) internal respiration
   4) cellular respiration
E) Control of breathing
   1) the respiratory center
      a) pneumotaxic area
      b) apneustic area
   2) Hering-Breuer reflex
   3) Chemical factors
F) Some breathing disorders
   1) Paralysis of breathing muscle
   2) Bronchial asthma
   3) Emphysema
   4) Lung cancer

UNIT III

1. The Urinary System
   A) Kidneys
      1) anatomical location
      2) structures
         a) renal sinus
         b) renal pelvis
         c) renal medulla
         d) renal cortex
         e) hilum
         f) the renal portal system
         g) nephrons
      3) Functions
         a) urine formation
         b) water and electrolyte balance
   B) Ureters
      1) anatomical location
      2) structural make-up
      3) function

C) The urinary bladder
   1) anatomical location
   2) structural make-up
   3) function

D) The Urethra
   1) anatomical location
   2) structural make-up
   3) function

E) The micturition reflex

2. Water and Electrolyte Balance

A) Fluid compartments
   1) introcellular compartment
   2) extracellular compartments
   3) transcellular compartments

B) The movement of fluids between compartments

C) Water balance
   1) water intake
   2) water output
   3) regulation of water balance

D) Electrolyte Balance
   1) electrolyte intake
   2) electrolyte output
   3) regulation of electrolyte balance

E) Disorders of the water and electrolyte balance
   1) dehydration
   2) water intoxication
   3) edema
   4) sodium/potassium imbalances
      a) hyponatremia
      b) hypernatremia
      c) hypokalemia
      d) hyperkalemia
   5) imbalances of other electrolytes: hypo and hyper concentrations
      a) calcium
      b) magnesium
      c) chlorine
      d) phosphates

F) pH
   1) pH (defined)
   2) sources of hydrogen ions
   3) regulation of hydrogen ion concentration
   4) acid/base buffer system

G) Disorders of the acid/base balance
   1) acidosis, types and causes
      a) respiratory acidosis
      b) metabolic acidosis
   2) Alkalosis, types and causes
      a) respiratory alkalosis
      b) metabolic alkalosis

3. The reproductive system
   - A) The function of the reproductive system
   - B) Gametogenesis
     1) spermatogenesis
     2) oogenesis
   - C) The male reproductive organs
     1) names and anatomical location
     2) histology
     3) function
   - D) The hormones of the male reproductive and their function
   - E) The female reproductive organs
     1) names and anatomical location
     2) histology
     3) function
   - F) The female reproductive cycle
     1) menarche
     2) menopause
   - G) Hormonal control of the female reproductive cycle
     1) pituitary hormones
     2) ovarian hormones
   - H) The mammary glands
     1) histological make-up
     2) secretions and the regulation of the secretions
   - I) Birth control methods
   - J) Some common S.T.D.'s
   - K) Pregnancy
     1) ovulation
     2) fertilization
     3) early embryonic development
4. Human Growth and development
   - A) Cleavage
     1) zygote
     2) morula
     3) blastula
     4) blastocyst
     5) gastrula
   - B) The germ layers and their development
     1) ectoderm
     2) mesoderm
     3) endoderm
   - C) The extra-embryonic membranes and their functions
     1) chorion
     2) amnion
     3) allantois
     4) yolk sac

D) Fetal stage
   1) growth
   2) development
E) Fetal circulation
F) Postnatal period
   1) neonatal
   2) infancy
   3) childhood
   4) adolescence
   5) adulthood
   6) senescence

5. Heredity
   A) Meiosis, chromosomes, genes and heredity
   B) Mendelian inheritance
      1) law of segregation
      2) law of independent assortment
      3) law of dominance
      4) other terms
   C) Crosses
      1) monohybrid
      2) dihybrid
      3) probability
   D) Epistasis
   E) Gene interactions
   F) Sex determining chromosomes
   G) Sex linked traits
   H) Non-disjunction of chromosomes
      1) aneuploidy
         a) trisomic cells
         b) monosomic cells
   I) Quantitative inheritance
      1) polygenes
      2) multiple alleles
   J) Some Human Genetic Disorders