

Tompkins Cortland Community College
Master Course Syllabus

Course Discipline and Number: BIOL 202
Course Title: Human Anatomy and Physiology II

Year: 2023-2024
Credit Hours: 4

Attendance Policy: To maintain good grades, regular attendance in class is necessary. Absence from class is considered a serious matter and absence never excuses a student from class work. It is the responsibility of all instructors to distribute reasonable attendance policies in writing during the first week of class. Students are required to comply with the attendance policy set by each of their instructors. Students are not penalized if they are unable to attend classes or participate in exams on particular days because of religious beliefs, in accordance with Chapter 161, Section 224-a of the Education Law of the State of New York. Students who plan to be absent from classroom activity for religious reasons should discuss the absence in advance with their instructors. See college catalog for more information.

Services for Students with Disabilities: It is the College's policy to provide, on an individual basis, appropriate academic adjustments for students with disabilities, which may affect their ability to fully participate in program or course activities or to meet course requirements. Students with disabilities should contact the Coordinator of Access and Equity Services, to discuss their particular need for accommodations. All course materials are available in alternate formats upon request.

Course Description

The second course of a two-semester introductory level sequence in human anatomy and physiology intended for students pursuing a career in fields such as medicine, chiropractic, physical therapy, physical education, or recreation. Topics considered are the endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary and reproductive systems, and early development. Dissection of the cat supplements the laboratory materials. Substantial outside preparation for lectures and laboratories is required. BIOL 202 fulfills the SUNY General Education Natural Sciences requirement. Prerequisites: BIOL 201; prior completion or concurrent enrollment in ENGL 100 and MATH 095 or MATH 098 and RDNG 116 if required by placement testing; 4 Cr. (3 Lec., 3 Lab.) Spring semester.

Course Context/Audience

This course will prepare the student to take additional course work in fields requiring a full year of human anatomy and physiology. It is an appropriate transfer course for those students who are considering careers in biology, physical education, physical therapy, chiropractic, and medicine (the student should check with his/her intended transfer institution about specific transfer equivalency).

Basic Skills/Entry Level Expectations

Writing: WC College level writing skills are required. See course co-requisites or pre-requisites.
Math: M3 MATH 095 or MATH 098 if required by placement testing.
Reading: R4 Before taking this course, students must satisfactorily complete RDNG 116 or have assessment indicating that no reading course was required.

Course Goals

This course is the second of a two semester sequence, in which human anatomy and physiology are studied using a body systems approach, with emphasis on the interrelationships between form and function at the gross and microscopic levels of organization. The endocrine, cardiovascular, lymphatic, respiratory, and digestive systems; urinary system, fluid and electrolyte and acid/base balance; male and female reproductive systems and early development are covered.

Course Objectives/Topics

Objective/Topic	# Hours
<u>Endocrine System</u> - Students who have completed this section of the course should be able to identify and describe the major gross and macroscopic anatomical components of the endocrine system, and explain	9 Hours

the functional roles of their respective hormones in communication, control, and integration. This section of the course includes the following topics: general functions of the endocrine system, definition and chemical classification of hormones, control of hormone secretion, mechanisms of hormone actions at effectors, roles of the hypothalamus and pituitary, identity, secretory control and functional roles of the major hormones of the pituitary, adrenal, thyroid, parathyroid, pancreas, including the effects of hypo- and hyper-secretion, patterns of hormonal action (including antagonistic, synergistic, permissive, and integrative), functions of hormones secreted by other endocrine tissues and cells (such as erythropoietin, thymosin, digestive hormones, placental hormones, atrial natriuretic peptide, vitamin D, eicosanoids, and growth factors), hormonal response to stress. Since the endocrine system plays a key role in the regulation and integration of body organ systems, detailed aspects of endocrine function will be emphasized throughout both semesters of the course.	
<u>Cardiovascular System</u> - Students who have completed this section of the course should be able to identify and describe the major gross and microscopic anatomical components of the cardiovascular system and explain their functional roles in transport and hemodynamics. This section of the course includes: general functions of the CV system, formation and composition of blood plasma, identity, microscopic anatomy, numbers, formation, and functional roles of the formed elements of the blood, hemostasis, including coagulation of the blood, ABO and Rh blood grouping, gross and microscopic anatomy of the heart, the conduction system of the heart, physiology of cardiac muscle contraction, pattern of blood flow through the heart and to the major vessels leading directly to or from the heart, the cardiac cycle, including the basic rhythm of heartbeat, pressure and volume changes, heart sounds, and an introduction to the ECG, regulation of stroke volume and heart rate, anatomy and functional roles of the different types of blood vessels, patterns of blood circulation throughout the body, including systemic, pulmonary, coronary, hepatic portal, and fetal circulations, blood pressure and its functional relationship to cardiac output, peripheral resistance, and hemodynamics.	27 Hours
<u>Lymphatic System</u> - Students who have completed this section of the course should be able to identify and describe the gross and microscopic anatomical components of the lymphatic system and explain their functional roles in fluid dynamics and immunity. This section of the course includes: general functions of the lymphatic system, gross anatomy including the pattern of lymph circulation, lymph formation and flow mechanisms, nonspecific resistance to disease and the inflammation response, antibody-mediated (humoral) immune response, cell-mediated immune response, roles of B cells and T cells in immune responses.	3 Hours
<u>Respiratory System</u> - Students who have completed this section of the course should be able to identify and describe the major gross and microscopic anatomical components of the respiratory system and explain their functional roles in breathing/ventilation and in the processes of external and internal respiration. This section of the course includes: general functions of the respiratory system, gross and microscopic anatomy of the respiratory tract and related organs, mechanism of pulmonary ventilation, air volumes and capacities (spirometry), mechanism of gas exchange in lungs and tissues, respiratory gas transport in the blood, control of pulmonary ventilation.	12 Hours
<u>Digestive System</u> - Students who have completed this section of the course should be able to identify and describe the major gross and microscopic anatomical components of the digestive system and explain their functional roles in digestion, absorption, nutrition, metabolism, excretion, and elimination. This section of the course includes: general functions of the digestive system, gross and microscopic anatomy of the GI tract and the accessory organs of digestion, mechanical and chemical processes of digestion and absorption, processes of excretion and elimination, hormonal and neural regulation of digestive processes, homeostatic integration with other systems, nutrition and metabolism, cellular respiration, catabolism and anabolism of carbohydrates, lipids and proteins, metabolic roles of specific tissues and organs, including the liver, adipose tissue, and skeletal muscle, hormonal and neural regulation of digestive processes, energy balance, metabolic rate and thermoregulation, homeostatic integration with other systems.	15 Hours
<u>Urinary system</u> - Students who have completed this section of the course should be able to identify and describe the major gross and microscopic anatomical components of the urinary system and explain their functional roles. This section of the course includes: general function of the urinary system, gross and microscopic anatomy of the urinary tract, including histology of the nephron, processes of urine formation, including filtration, reabsorption and secretion, and excretion of urine, factors regulating and altering urine volume and composition, including the renin-angiotension mechanism and the roles of ADH and aldosterone, endocrine activities of the kidney that affect other systems, including Vit D activation and secretion of erythropoietin, innervation and control of the urinary bladder.	9 Hours

Fluid /Electrolyte and Acid/Base Balance - Students who have completed this section of the course should be able to identify and describe the physiology of the homeostatic mechanisms that control fluid electrolyte and acid/base balance. This section of the course includes: identification and description of the major fluid compartments, including intracellular, extracellular, intravascular, and interstitial (including volume and chemical composition of these fluids), movements between the major fluid compartments, causal forces, volumes, and electrolyte balance, regulation of water intake/output, maintenance of sodium, potassium and calcium ions levels (and a review of the hormones that effect their control), buffer systems and their roles in acid/base balance, and which are used within each compartment, roles of the urinary and respiratory systems in acid/base balance.	3 Hours
Reproductive System - Students who have completed this section of the course should be able to identify and describe the major gross and microscopic anatomical components of the male and female reproductive systems and explain their functional role in reproduction. This section of the course includes the following topics: general functions of the reproductive system, gross and microscopic anatomy of the male and female reproductive tracts and external genitalia, reproductive cell division (meiosis, gametogenesis, folliculogenesis), specific roles of the ovaries, uterine tubes, uterus, vagina, testes, epididymis, ductus deferens, seminal vesicles, prostate, bulbourethral glands and urethra, neural and hormonal regulation of reproductive functions, including puberty, the female ovarian and menstrual cycles, spermatogenesis and the climacteric, development of the embryo/fetus and the hormonal changes during pregnancy, parturition and labor, mammary gland anatomy and physiology, gender determination and introductory human genetics.	12 Hours

General Education Goals - Critical Thinking & Social/Global Awareness

CRITICAL THINKING OUTCOMES	HOW DOES THE COURSE ADDRESS THE OUTCOMES (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
Students will be able to ➤ develop meaningful questions to address problems or issues. ➤ gather, interpret, and evaluate relevant sources of information. ➤ reach informed conclusions and solutions. ➤ consider analytically the viewpoints of self and others.	This lab science course relies heavily on the scientific method to observe, propose a question, and formulate a testable hypothesis. It requires students to develop testable hypotheses on basic lab or inquiry-based projects. Aside from lecture, students must read and comprehend complex concepts that encompass all body systems on micro- and macro-levels. Exam questions should focus on application and evaluation type thinking skills (not rote memorization) of content. Group work should encompass problems sets with alternative answers Students must apply textbook knowledge toward solving complex questions or address current issues relative to body/organ systems based on the scientific method &/or principles of scientific inquiry. Have students work in groups to solve complex problem sets on lecture content relative to every day aspects of health, science, and technology. Students work in groups during lab and must explain, implement and interpret a course of action to complete the activity. Encourage students to offer and accept critique of each other's interpretation of directions and results. Use peer evaluations for group work to provide feedback on a student's ability to interact within a group.

SOCIAL/GLOBAL AWARENESS OUTCOMES	HOW DOES THE COURSE ADDRESS THE OUTCOMES (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
➤ Students will begin to understand how their lives are shaped by the complex world in which they live. ➤ Students will understand that their actions have social, economic and environmental consequences.	From a scientific perspective the complex interactions among energy and chemical cycles, and living systems are covered, including the role scientific discovery plays in helping the layperson understand the complex world on a macro-level, and individual health on a micro-level. In context of each chapter, expand on the emergent properties of biological systems and human organ systems, beginning with basic chemistry and continuing with cellular biology, histology through organ systems of the human body. Students learn how scientific discovery has changed man's outlook on life and lead to both societal and health changes which impact society, sociology, psychology, religion and philosophy. Discuss current societal and health issues in light of scientific concepts and advances that the layperson does not fully comprehend. Bring to light that disagreement among the scientific and health communities is the norm before data is accepted as fact. Science and technology are engines that drive economic development. The career choices they make will have an impact on their community. Discuss existing and emerging health-related professions that revolve around each new scientific discovery, including information on how these changes contribute to increased standards of living &/or quality of life/health.

Instructional Methods

This course should be taught using an integrated lecture/lab format. The laboratory component is essential to the students' experience, as it gives opportunities for "hands-on" work, and should encourage critical thinking, the understanding of scientific methodology, and the application of scientific principles. Direct student participation is preferable to instructor demonstration. Laboratory experiences should include exercises that demonstrate both anatomical and physiological concepts. A dissection of the cat along with other animals (fetal pigs) and animal organs as appropriate (such as brains, kidneys, hearts, etc.) is a valuable learning experience not achievable by other means; models, computer simulations and other audiovisual materials should also be available to supplement the dissections. **NOTE: As the opportunity presents a visit to a gross anatomy lab is scheduled in which students inspect dissected human cadavers.**

Methods of Assessment/Evaluation

Method	% Course Grade
Exams on materials presented in both lecture and lab	80%
Quizzes on material presented in lecture and/or lab	20%

Text(s)

Fundamentals of Anatomy and Physiology, Martini, Frederic, 7th Edition, © 2005 Benjamin Cummings

Any 2 semester text and lab manual is appropriate; any text published within the last 5 years is probably acceptable.

Previously, TC3 faculty have used texts by Spence & Mason, Marieb, Tortora, & Martini. The Marieb lab manual has been the standard.

Human Anatomy and Physiology, Marieb, Elaine, 7th Edition, © 2006 Benjamin Cummings

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Bibliography

Not available at this time

Other Learning Resources

Audiovisual

Various films and videos - especially "The Work of the Heart" and "The Work of the Kidneys"

Check the database and ask the personnel at the AV desk for information on what is available, both in-house and through BOCES.

Electronic

The text has numerous links to internet resources.

Other

The college owns several sets of the ADAM Interactive Physiology CD programs; this set is excellent for demonstration of difficult concepts, contains animations of some physiological processes, and has been used by many students as a method to review basic anatomy and complex physiological concepts.