

## University of Houston-Downtown

**Course Prefix, Number, and Title:** BIOL 1310: Human Biology

**Credits/Lecture/Lab Hours:** 3/2/2

**Foundational Component Area:** Life and Physical Sciences

**Prerequisites:** Completion or enrollment in ENG 1301

**Co-requisites:** None

**Course Description:** An integrated lecture/laboratory course for non-science majors. This course will include the scientific method and the relationship between science and technology. Major themes will include cells, organization of the human body and functions of organ systems. Issues related to human biology (ie. genetic engineering, human reproduction) will also be discussed. Laboratory activities will be investigative in nature and relate to lecture topics.

**Demonstration of Core Objectives within the Course:**

Assigned Core Objective (Lea will complete)	Learning Outcome Students will be able to:	Instructional strategy or content used to achieve the outcome	Method by which students' mastery of this outcome will be evaluated
Critical Thinking  Empirical & Quantitative Reasoning	Utilize scientific processes to identify questions pertaining to natural phenomena.	Students will investigate the following <b>topics within human biology:</b> living/nonliving characteristics; organization of life; energy requirements of life; growth and reproduction of life; life requires adaptation; scientific methodology in understanding observed phenomena; chemistry of life; animal/plant cell structure and function; energy for life and membrane transport; photosynthesis and cellular respiration; cell division, DNA replication, and meiosis; inheritance; skeletal, muscular, digestive, circulatory, respiratory, lymphatic, immune, endocrine, and reproductive human systems structure and function.  <b>Analyzing a Scientific Article-</b> Students will select a journal	Student mastery of the course content will be evaluated through written examination.  Students will evaluate a research journal article and writing a one-page summary (instructor will provide instructions) (Assessment will use a rubric-see appendix).  Students will learn to apply the scientific method by using a virtual laboratory exercise available through McGraw-Hill Connect website. The activity will involve construction of the parameters of a

		<p>article review for analysis using the scientific method as a metric of quality. Strengths and weakness based on the metric will be identified and a final report outlining the level of quality of the article constructed.</p> <p><b>Hypothesis testing: Fat in Foods testing -</b> Students will use scientific method in comparing the level of lipids across common saturated/unsaturated consumer products.</p> <p><b>Simulating Membrane Transport-</b> Students construct a simulated membrane using plastic bag to measure movement across a semi-permeable membrane then develop a PowerPoint lab report of their findings.</p> <p><b>Photosynthetic process testing-</b> Students will investigate the photosynthetic process using spinach discs, detergent, and artificial sunlight describing each aspect of photosynthesis in a lab report including images of the process.</p>	<p>research experiment/project using drosophila fruit flies. Understanding of scientific methodology and completion of the virtual lab will be assessed and assigned a grade.</p> <p>Using common household supplies and chemicals, students will simulate a semi-permeable membrane, gather data on membrane porosity based on chemical movement, and produce a PowerPoint that includes the scientific methodology, draw conclusions, provide APA-style references used to execute the simulation. Rubric will provide assessment-see appendices.</p> <p>Students will take a test detailing photosynthetic properties and processes. Understanding of photosynthesis will be assessed and assigned a grade through McGraw-Hill website exam.</p>
<p>Critical Thinking  Empirical &amp; Quantitative Reasoning</p>	<p>Utilize scientific processes to develop hypotheses, collect and analyze data using quantitative and qualitative measures.</p>	<p><b>Punnett Squares and Inheritance Patterns testing-</b> Students will device an genetic phenotypic/genotypic characteristics analysis for a <i>Drosophila</i> fruitfly for four genetic characteristic (eye color, wingedness, sex, and humpbackness). A report will be written indicating %</p>	<p>Students will apply understanding of genetics and inherited patterns in an applied lab exercise available through McGraw-Hill Connect website. The activity will involve selecting traits of drosophila fruit flies then calculating the expressed</p>

		<p>genotype/phenotype trait expressions expected for P1 and F1 generations.</p> <p><b>Fitness Assessment-</b> Students will apply fitness assessment metrics to determine level of fitness, individual levels of homeostasis. An individual plan of improvement will be constructed based on strengths and weaknesses identified on each component of fitness (muscle strength, agility, cardiovascular capacity, speed, endurance, and flexibility) thus improving homeostasis and vital organ systems.</p> <p><b>Heart Rate testing-</b> Students will use heart rate as a component of cardiovascular health, then determine individual heart rates and target heart rates to construct a plan of improvement of their own cardiovascular system.</p>	<p>traits. Understanding of genetics and completion of the virtual lab will be assessed and assigned a grade.</p> <p>Students will actively complete each fitness component self-assessment, document through digital images, submit outcomes to the U.S. Presidential Fitness Award website for personal certificate, and submit fitness certificate along with personal evaluation of steps necessary to improve personal levels of homeostasis beneficial to organ systems. Assignment to be graded by rubric –see appendices.</p> <p>Individual heart rate and target heart rate levels as well as blood pressures will be measured. Students will then construct a personal plan toward improving individual HR and BP for their individual age, weight, and findings based on investigated norms to be submitted for grading (rubric assessment –see appendices).</p>
<p>Critical Thinking Empirical &amp; Quantitative Reasoning</p>	<p>Utilize scientific processes to effectively communicate the analysis and results using written, oral and visual communication.</p>	<p><b>Bioengineering and Genetic Counseling-</b> Students will examine evidence of bioengineering of organs from multiple sources and develop an argument for action based on the</p>	<p>Students will write position papers indicating both the pro and con position inclusive of data collected serving as evidence and documented</p>

<p>Communication</p>		<p>data they collect.</p> <p><b>Water's Importance Discussion-</b> Students will investigate water's properties and the important role played in plants during extreme droughts while relating the impact on animal systems ultimately.</p> <p><b>Caloric Intake/Expenditure Project-</b> Students will track caloric intake and expenditure over a three-week period, then report on weekly caloric levels and total/average caloric levels lost or gained along with personal insights and recommendations of this applied nutrition experience.</p>	<p>references used to develop position paper (Rubric included in appendices).</p> <p>Using a web-based discussion board, students will examine the water's importance during a drought situation across both plant and animal perspectives including mechanisms employed by plants to sustain life in low water conditions (Assess by rubric-see appendices).</p> <p>Students will construct a three-week food journal and calculate weekly calories gained/lost; three-week total of calories gained/lost; overall amount of weight gained/lost; and personal insights plus recommendations will be included. (Assessment by rubric-see appendices)</p> <p>Oral presentations of position papers on bioengineering an genetic counseling will be made using the <u>BBL Collaborate software</u> (each student will need a web camera and microphone) and oral presentation time will be provided in the course. A rubric representing effective communication will be used to assess each presentation.</p>
<p>Teamwork</p>	<p>Collaborate in the evaluation</p>	<p><b>Body Mass Index Panel</b></p>	<p>Students will prepare</p>

	<p>of the quality of scientific evidence from multiple perspectives toward the goal of reaching a shared objective.</p>	<p><b>Recommendations-</b> Students will individually gather anonymous height/weight/gender data from 10 sources, post their findings, and based on the larger pool of data, students will examine data to determine BMI frequencies across gender while comparing this data to known national averages for gender and construct conclusions as to findings. Critiques of conclusions will be submitted.</p> <p><b>Datasets and Cardiovascular/Respiratory Disease Incidence Nationally and Regionally Panel Discussion-</b></p>	<p>visual graphical analyses of their individual pool of 10, then using the larger pool data draw conclusions for posting while offer critical analyses of other conclusions. A conclusions posted will be assessed using a rubric (Assessment by rubric).</p> <p>In small groups students will accurately analyze and interpret a CDC dataset (health, infectious disease, other) by creating a raw data table, a graphical analysis of the mean, median, mode, frequency, and SD, (quantitative). They will also create a one-page expository describing meaning derived from the data manipulation (qualitative) and posting /presenting this presentation to peers; a critical analysis of other presentations will address further understanding of the use of datasets as evidence of disease incidence impact at the system level. [Rubric will be used to assess-see appendices] Oral presentation will take place using BBL Collaborate Software and webcamera/microphone.</p>
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**Additional Course Outcomes:**

Learners will:

- Examine and analyze the characteristics of living and non-living things and hypothesis-driven research.
- Explain and describe the biochemistry impacting biological macromolecules essential to living things.
- Analyze similarities and differences between plant and animal cells structurally and functionally understanding the role played in human life.
- Examine and analyze cellular respiration and its role in all energy systems and human organ systems functions.
- Analyze and compare/contrast cell division and cell reproduction as contributory to human genetic makeup, variation, and species survival.
- Explain and classify the organizational structure of organ systems, component organs, associated acute and chronic disease states, and the complementary role each has in human health.

**Course Outline:**

<b>Module</b>	<b>Module Description</b>	<b>Activities</b> (All Required Readings precede Activities)
<b>Module 1: Study of Life</b>	Module 1 focuses on the properties of life at its many levels and diverse forms, natural selection, the process of science, and hypothesis-driven science	Module 1 Discussion Topics Scientific Paper Analysis Writing Project Module 1 Connect Quiz
<b>Module 2: The Chemistry of Biology</b>	Module 2 focuses on the chemistry of living and non-living things, what matter is, the nature of chemical bonding, chemical reactions, and acids, bases, and pH	Module 2 Discussion Topics Fat in Foods Home Lab Module 2 Connect Quiz
<b>Module 3: Cells-Units of Life</b>	Module 3 focuses on organic compounds, small building blocks, biological molecules such as carbohydrates, lipids, proteins, and nucleic acids; focuses on microscopy cell viewing techniques, types of cells, membrane structures and functions of animal cells, and plant cell membrane structure and function	Module 3 Discussion Topics Virtual Microscopy Lab Module 3 Connect Quiz <b>Modules 1-2-3 Test #1</b>
<b>Module 4: Energy of Life and Membrane Transport</b>	Module 4 focuses on microscopy cell viewing techniques, types of cells, membrane structures and functions of animal cells, and plant cell membrane structure and function; focuses on the conservation of energy, entropy, chemical and food energy, ATP and cellular work, enzymes, membrane functions, passive/active transport, osmosis, and water balance	Module 4 Discussion Topics Cell Membrane Porosity Home Lab Module 4 Connect Quiz
<b>Module 5: Photosynthesis</b>	Module 5 focuses on photosynthesis, chloroplasts, light reactions, pigments, harvesting light energy, and the Calvin cycle	Module 5 Discussion Topics Photosynthesis Home Lab Module 5 Connect Quiz
<b>Module 6: Cellular Respiration</b>	Module 6 focuses on chemicals between photosynthesis and cellular respiration, oxygen's role in cellular respiration, stages of cellular respiration,	Module 6 Discussion Topics Leaf Disk Assay Home Lab Module 6 Connect Quiz

	and anaerobic food energy	
<b>Module 7: Cell Division, DNA Replication, and Meiosis</b>	Module 7 focuses on cell division, the cell cycle, mitosis, cytokinesis, meiosis, and genetic variation; focuses on DNA structure and function, DNA replication, genetic information from DNA to RNA to protein, the genetic code, and transcription and translation	Module 7 Discussion Topics Claymation Mitosis Lab Module 7 Connect Quiz <b>Modules 4-5-6-7 Test#2</b>
<b>Module 8: Patterns of Inheritance</b>	Module 8 focuses on genetic laws of segregation and independent assortment, probability rules, family pedigrees, incomplete and polygenic dominance, linked genes, crossing over, and sex-linked genes	Module 8 Discussion Topics Virtual Punnett Square Lab Inheritance Pedigree Tree Lab Virtual DNA Extraction Lab Lab Module 8 Connect Quiz <b>Module 9 Oral Presentation-BBL Collaborate</b>
<b>Mid-Term</b>	Mid-Term Exam will include Modules 1-7	Online Secured Web Browser; Instructor Issued Password Needed to Enter Exam
<b>Module 9: Animal Organ Systems</b>	Module 9 focuses on structural organization of organ systems, form fits function concept, tissues, organs, and organ systems, homeostasis, thermoregulation, and osmo-regulation	Module 9 Discussion Topics Human Systems Lab Project Module 9 Connect Quiz <b>Modules 7-8-9 Test#3</b>
<b>Module 10: Skeletal and Muscular System</b>	Module 10 focuses on the human skeleton and major muscle groups, reviews bones providing support, protection to internal organs and bone growth; muscles provide movement and an understanding of muscle composition and function as well as fitness as a component of skeletal and muscle systems	Fitness Assessment Home Lab Module 10 Connect Quiz
<b>Module 11: Digestive System and Nutrition</b>	Module 11 focuses on animal nutrition, food processing, the human digestive system, component organs, nutritional requirements, food labels, and nutritional disorders	Body Mass Index Home Lab Calorie Intake/Expenditure Lab Project Module 11 Connect Quiz <b>Module 11 Oral Presentation-BBL Collaborate</b>
<b>Module 12: The Circulatory and Respiratory Systems</b>	Module 12 focuses on closed circulatory systems, structures of the human circulatory system, path of blood, the heart, blood vessels and cardiovascular disease, the structures of the respiratory system, breathing, and hemoglobin and cellular gas exchange	Virtual Blood Pressure Lab Lung Function Home Lab Heart Rate Testing Home Lab Module 12 Connect Quiz

<b>Module 13: The Lymphatic and Immune Systems</b>	Module 13 focuses on innate immunity, the lymphatic system, adaptive defenses, responses to invaders, immune disorders, allergies, autoimmune diseases, and immunodeficiency diseases	No Labs Module 13 Connect Quiz
<b>Module 14: The Endocrine and Reproductive System</b>	Module 14 focuses on an overview of hormones, the endocrine system and its organs, hypothalamus gland, pituitary gland, the pancreas, adrenal glands, and the male and female gonads; focuses on sexual reproduction, the male and female reproductive systems, gametogenesis, the ovulatory cycle, human development, fertilization process, embryonic development, pregnancy stages, and reproductive technologies	Texas Diabetes Datasets Disease Lab Project Texas Birth Defects Lab Project Student Panel Oral Discussion (BBL Collaborate) Module 14 Connect Quiz <b>Modules 10-11-12-13-14 Test#4</b>
<b>Final</b> Dec. 10-11	<b>Final Exam will include Modules 8-14</b>	

**Grading/Course Content which Demonstrates Student Achievement of Core Objectives:**

**Course Grade**

**A: 90-100**

**B: 80-89**

**C: 70-79**

**D: 60-69**

**F: 0-59**

<b>Required Activities &amp; Assignments</b>	<b>Point Values</b>	<b>Percentage</b>
Discussion Topics	200	15%
Lab Projects (Virtual, Home, Project)	400	31%
Module Topic Oral Presentations	200	15%
Connect Quizzes	100	8%
Connect Tests	200	15%
Mid-Term Exam	100	8%
Final Exam	100	8%
<b>Total</b>	<b>1300</b>	<b>100%</b>