

BIOL 14: HUMAN BIOLOGY

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	5
Hours:	4 lecture, 3 laboratory per week (84 total per quarter)
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Area III: Natural Sciences
Transferable:	CSU/UC
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

Student Learning Outcomes

- The student will be able to describe the theory of evolution by natural selection and explain how it unifies all living things at least three different levels of the biological hierarchy.
- The student will be able to evaluate basic scientific research as described in the popular press and explain the study in terms of the scientific method.

Description

An introduction to biology using human beings as the exemplary organism. The evolution and biological unity of the human species and of all life forms; American and global patterns of human biological diversity; reproduction and heredity; how human organ systems function; humans and their environment; the uses and misuses of the scientific method; the scientific and biological bases for human equality.

Course Objectives

The student will be able to:

- describe the scientific method and use it to answer simple questions about the natural world
- explain how biologists classify living things; define a species
- explain the theory of evolution by means of natural selection
- explain the African origin of the human family, genus and species
- solve simple problems in human genetics
- describe how human genetic diversity is patterned and explain how these patterns undermine the notion of biological "races" within the human species
- describe global and American patterns of human diversity and relate these patterns to genetic and cultural inheritance
- describe the functions of the digestive and excretory systems
- describe the functions of the circulatory and respiratory systems
- describe the functions of the reproductive system
- identify the cells involved in the immune response and describe the function of the immune system
- describe the organization of the nervous system and explain the fundamentals of how the nervous system functions
- describe how organisms interact with their environments and explain the unique relationship and responsibility which humans bear towards their environment
- assess the biological diversity of humans and the scientific evidence supporting human unity and equality

Course Content

- Describe the scientific method
 - The scientific method: science and pseudo-science
 - Hypothesis formation
 - The design of experiments: good experiments and bad experiments
 - Analyzing and evaluating data - how not to "jump to conclusions"
 - Criticize intelligently the design of experiments and how the data from those experiments are evaluated and analyzed
 - Experiments and data dealing with alleged differences between human groups
 - Experiments and data that examine the human impacts on the environment
- Characteristics and diversity of living things
 - What it means to be alive
 - How biologists classify living things
- Evolution
 - Darwin's theory of evolution by means of natural selection
 - The traditional view of biological diversity
 - Darwin's new view of biological diversity
 - The importance of Darwin's view
 - The origin of species
 - What is a species
 - Explain how populations evolve and how new species from time to time arise
- Human evolution
 - The biological unity of the human species
 - The single, African origin of the human family, genus and species
 - How humans spread to other parts of the world
 - How adaptation to local environments produced variation in external traits, such as limb length, hair texture and skin color
 - How adaptation to local environments influenced cultural practices
- Human Genetics: Reproduction and heredity
 - Mitosis - production of cells for development and growth
 - Meiosis - the cellular basis of heredity
 - Mendel's experiments and principles of inheritance
 - The Principle of Segregation
 - The Principle of Independent Assortment
 - Sex-linked traits and multiple alleles
 - What exactly is a gene (the chemical nature of DNA)
 - Watson and Crick and the "double helix"
 - How genes specify proteins - translation and the "genetic code"
 - Why genes don't usually specify phenotypes
 - The influence of the environment
 - The influence of culture
 - The influence of "developmental noise"
 - Patterns of human diversity
 - Basic population genetics
 - The Hardy-Weinberg Equation
 - What causes allele frequencies in population to change
 - How is human diversity patterned
 - Most human variation is within populations, not between populations
 - Variation between populations is clinal (gradual), not clumped
 - Human "racial" differences are recent, not ancient
 - The human species is genetically well mixed
 - Global and American patterns of genetic diversity
 - How infectious disease patterns and other environmental factors have influenced these patterns of genetic diversity
 - How cultural inheritance has influenced these patterns of genetic diversity
- Form and function of the human body - digestive and excretory systems

1. Intake and outgo
2. Nutritional needs of human beings
3. How the digestive tract and the kidneys work
4. How a balance is maintained between what comes in and what goes out
- I. Form and function of the human body -Interaction of the respiratory and circulatory systems
 1. Energy transformation in cells
 2. Role of oxygen in metabolism
 3. Cardiovascular diseases
- J. Form and function of the reproductive system
 1. Anatomy and physiology of human males and females
 2. Relationship between meiosis and spermatogenesis and oogenesis
 3. Major hormones involved in regulation of reproduction and the ovarian and uterine cycles in females
 4. Major hormones involved in the production of sperm in males
 5. How does fertilization and pregnancy occur
 6. Preventing pregnancy
- K. Form and function of the immune system
 1. Cells involved in the immune system
 2. Organs of the lymphatic system
 2. Antibody response
 3. Allergy and autoimmunity - the down side of the immune system
 4. AIDS
 5. Being aware
 6. Cancer - causes and treatments
- L. How the human nervous system is organized
 1. How nerve cells work
 2. The complexity of the human nervous system
- M. The human role in nature
 1. Basic ecology
 - a. Organisms
 - b. Populations
 - c. Communities
 - d. Ecosystems
 2. Human population growth
 - a. History
 - b. Cultural differences
 - c. Implications for the future
 3. The unique relation of humans to their environment - what is the single "ecological niche" of Homo sapiens

Lab Content

Labs to include collaborative exercises that will help students in the:

- A. Understanding of scientific process and experimental design.
- B. Understanding of cell structure and basic cell functions such as fluid balance and cell division.
- C. Explorations of human anatomy and physiology, including tissues, organs and organ systems - digestive system, reproductive system, cardiovascular system, lymphatic system.
- D. Investigate the evidence for evolution.
- E. Explore genetics and practice genetic problems.

Special Facilities and/or Equipment

- A. Fully equipped biology laboratory, lecture room, computer facilities, and safety glasses.
- B. When taught via Foothill Global Access, on-going access to computer with email software and hardware; email address.

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

- A. Oral and/or written laboratory reports.
- B. Demonstration of mastery of lecture material by written quizzes, midterm exams and/or a comprehensive final.
- C. Oral presentations, written reports and/or participation in discussions based on assigned readings from books and journals.

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

- A. Lecture
- B. Discussion
- C. Cooperative learning exercises
- D. Laboratory

Representative Text(s) and Other Materials

Mader, Sylvia, and Michael Windelspecht. *Human Biology*. 15th ed. McGraw Hill, 2018.

Schultz, Gillian. *Laboratory Manual for Biology 14*. Foothill College, 2016.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- A. Reading assignments include:
 1. Textbook chapters
 2. Popular press articles related to class topics, including cancer and human evolution
- B. Writing assignments include:
 1. Write-ups of laboratory experiments and activities
 2. Evaluations and expository writing on assigned readings

Discipline(s)

Biological Sciences