



Syllabus

BIO 125 - Foundations of Life Science

General Information

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Course Prefix BIO

Course Number 125

Course Title Foundations of Life Science

Course Information

Catalog Description This course is a brief overview to the unifying concepts in biology including, but not limited to molecular, cellular, metabolic, genetic, evolutionary, and whole organismal biology. This course relates the relevant concepts of living organisms to their environment. The laboratory component supports and reinforces lecture content.

Credit Hours 4

Lecture Contact Hours 3

Lab Contact Hours 2

Other Contact Hours 0

Grading Scheme Letter

Prerequisites

None

Co-requisites

None

First Year Experience/Capstone Designation

This course **DOES NOT** satisfy the outcomes applicable for status as a FYE or Capstone.

SUNY General Education

This course is designated as satisfying a requirement in the following SUNY Gen Ed category

Natural Sciences (and Scientific Reasoning)

FLCC Values

Institutional Learning Outcomes Addressed by the Course

Vitality, Inquiry, Perseverance, and Interconnectedness

Course Learning Outcomes

Course Learning Outcomes

1. Identify and analyze fundamental concepts of biology - including basic molecular, cellular, metabolic, genetic, evolutionary, and whole organismal biology.
2. Utilize basic laboratory techniques to design and conduct experiments.
3. Articulate comprehensive conclusions through use of scientific inquiry.

Outline of Topics Covered

I. Taxonomic System of Classification

- a. characteristics of each Domain and/or Kingdom from a cellular, metabolic and whole organism level.
- b. scientific application of taxonomy
- c. application of these concepts

II. Molecular Biology

- a. Carbohydrates
- b. Lipids
- c. Proteins
- d. Nucleic Acids

III. Relationship between Nitrogenous Base sequence in DNA and Nitrogenous Base sequence in RNA and Amino Acid sequence in a polypeptide and the configuration of a protein and genetically based characteristics

IV. Basic Cellular Structure and Function

- a. Organelle identification
- b. Molecular components of organelle

- c. Metabolic function of organelle
 - i. In relationship to other organelles
 - ii. In relationship to the whole organism

V. Cellular energy

- a. Application of the First Law of Thermal Dynamics
- b. Aerobic Respiration
 - i. Flow of energy
 - 1. Glycolysis
 - 2. Krebs Cycle
 - 3. Electron Transport Chain
- c. Anaerobic Respiration
 - i. Lactic Acid Fermentation
 - ii. Alcohol Fermentation

VI. Photosynthesis

- a. Impact of photosynthesis and photosynthesizing organisms on the environment and evolution of Aerobic Respiration
- b. Flow of Energy
- c. Light Reaction
- d. Calvin Cycle

VII. Transportation of water from roots to leaves

- a. Osmotic Pressure
- b. Capillary Action
- c. Transpiration

VIII. Sexual vs. asexual reproduction

- a. Genetic differences
- b. Population variability as a result of each
- c. Evolutionary consequences of each

IX. Cell Division

- a. Mitotic Cell Division
 - i. Purpose
 - ii. Genetic Results of Mitotic Cell Division
 - iii. How these results are achieved
- b. Meiotic Cell Division
 - i. Purpose
 - ii. Genetic result of Meiotic Cell Division
 - iii. How these results are achieved
 - 1. Crossing over
 - 2. Law of Independent Assortment

- iv. Chromosomal Anomalies
- v. Sex Determination
- X. Mendelian Genetics
 - a. Chromosome, Gene, Homologous Pairs of Chromosome, Allele, Genotype vs. Phenotype
 - b. Punnett's Squares
 - c. Test Cross
- XI. Alternatives to Mendelian Genetics
 - a. Codominance
 - b. Incomplete Dominance
 - c. Multiple alleles
 - d. Pleiotropy
 - e. Polygenic Inheritance
 - f. Effects of environment of expression of genes
- XII. Evolution
 - a. Definition
 - b. Microevolution
 - i. Natural Selection
 - ii. Artificial Selection
 - iii. Non-selection Influences
 - 1. Genetic Drift
 - 2. Founders Effect
 - 3. Bottle Neck Effect
 - iv. Sexual Selection
- XIII. Macroevolution
 - a. The Biological Species Concept
 - b. Mechanisms of Speciation
 - i. Allopatric
 - ii. Sympatric
- XIV. Extinction
 - a. Throughout geological time
 - b. In recent history