

Bio 101

General Biology 1

COURSE OUTLINE

Prerequisites:

Prerequisite: Successful completion of MTE 1, 2, 3, 4, and 5, and a placement recommendation for ENG 111, co-enrollment in ENF 3/ENG 111, or successful completion of all developmental English requirements.

Course Description:

Focuses on foundations in cellular structure, metabolism, and genetics in an evolutionary context. Explores the core concepts of evolution; structure and function; information flow, storage and exchange; pathways and transformations of energy and matter; and systems biology. Emphasizes process of science, interdisciplinary approach, and relevance of biology to society.

Semester Credits: 4 Lecture Hours: 3 Lab/Recitation Hours: 3

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Bio 101, General Biology 101

Course Outcomes

At the completion of this course, the student should be able to:

- Describe the main themes in the study of life
- Explain the chemistry of life, including basic structure and properties of biological macromolecules
- Describe the structures within and surrounding the cell, giving their function
- Explain the cellular processes of cell respiration and photosynthesis
- Explain the processes of mitosis and meiosis
- Describe Mendel's laws and some of their variation
- Discuss some of the phenomena explained by the chromosomal basis of inheritance
- Describe the discovery and some of the properties of DNA
- Explain how a gene may ultimately produce a protein
- Be familiar with evolutionary trends of plants and animals
- Discuss anatomical structures and physiological processes that occur in the flowering plants

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Bio 101, General Biology I

Textbook:

Campbell Biology in Focus. Urry, Cain, Wasserman, Minorsky, & Reece. 2nd Edition. Pearson Publishing. ISBN: 9780134433769

Exploring Biology in the Laboratory Core Concepts. Pendarvis & Crawley. Custom Edition. Morton Publishing. ISBN: 9781617316586

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Bio 101, General Biology I

Topical Description:

Chapter 1: The Science of Biology

- The hierarchy of life
- The process of science
- Evolution as an example of scientific inquiry
- Unifying themes in biology

Chapter 21: The Evidence for Evolution

- Evidence for natural selection
- Artificial selection
- Fossil evidence
- Anatomical evidence
- Convergent evolution
- Molecular evidence

Chapter 28: Prokaryotes

- Diversity
- Cell structure
- Genetics
- Human bacterial disease
- Beneficial prokaryotes

Chapter 29: Protists

- Endosymbiotic theory
- Classification and diversity

Chapter 32: Fungi

- Definition and nutrition
- Classification and diversity
- Ecological impacts

Chapter 2: The Nature of Molecules and the Properties of Water

- Elements, Atoms, and Compounds
- Chemical Bonds
- Water's Life Supporting Properties
- Acids and bases

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Chapter 3: The Chemical Building Blocks of Life

- Introduction to Organic Compounds
- Carbohydrates
- Lipids
- Proteins
- Nucleic Acids

Chapter 14: DNA: the Genetic Material

- Discovery of DNA
- Structure
- DNA replication

Chapter 15: Genes and How They Work

- Central Dogma
- Genetic code
- Transcription
- Translation
- Mutations

Chapter 16: Control of Gene Expression

- DNA binding proteins
- Prokaryotic regulation: Lac operon
- Eukaryotic regulation
- Chromatin structure
- Posttranscriptional regulation

Chapter 10: How Cells Divide

- Binary fission
- Eukaryotic chromosomes
- Cell Cycle
- Mitosis
- Control of the cell cycle

Chapter 11: Sexual reproduction and meiosis

- Process of meiosis
- Meiosis vs. mitosis



Chapter 12: Patterns of Inheritance

- Principle of gene segregation
- Dihybrid crosses
- Extensions to Mendel's Laws

Chapter 13: Chromosomes, Mapping, and the Meiosis- Inheritance Connection

- Sex chromosomes
- Human genetic disorders

Chapter 4: Cell Structure

- Cell theory
- Microscopy
- Prokaryotes
- Eukaryotes

Chapter 5: Membranes

- Membrane Structure and Function
- Transport across membranes
- Osmosis

Chapter 6: Energy

- Thermodynamics
- ATP cycle
- Enzymes

Chapter 8: Photosynthesis

- Pigments
- Photosystems
- Light-dependent reactions
- Calvin cycle

Chapter 36: Seedless and Seed Plants

- Plant form
- Roots
- Stems
- Leaves



Chapter 7: How cells harvest energy

- Redox reactions
- Glycolysis
- Krebs cycle
- Electron transport and chemiosmosis

Chapter 9: Cellular Communication

- Receptors
- Signal transduction
- G-protein coupled receptors

Laboratory Topics

- The Metric System
- Scientific Method
- Overview of cell structure—bacteria, protists, plants
- Macromolecules
- DNA isolation
- Enzymes
- DNA fingerprinting
- DNA Microarray
- Plant Genetics
- Osmosis/Diffusion
- Photosynthesis/Chromatography
- Bryophytes and Ferns
- Gymnosperms and Angiosperms

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Bio 101, General Biology I

Notes to Instructors

1. Departmental policy dictates that instructors do not allow students to keep tests.
2. A comprehensive final exam counting 15% - 20% of the total grade will be given at the end of the semester.
3. Syllabus should state what the course grade will be based on, such as tests, quizzes, a comprehensive final exam, and any other assignments made by the instructor.
4. The VWCC Biology Department uses a 10 point grading scale.
5. Comprehensive study of the listed topics is beyond the reasonable expectations of a 15-week Biology 101 course. It is up to the discretion of the instructor to choose which topics are more detailed but each topic should be adequately covered.

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