Introduction to Biology

Course Text

Mader, Sylvia S. *Inquiry into Life*, 17th edition, McGraw-Hill, 2023, ISBN: 9781264155729

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Course Description

Introduction to Biology is an introductory course in the biological sciences.

Topics included are cell structure and function, bioenergetics, DNA structure and function, cell reproduction, taxonomy, evolution, ecology, and an overview of the anatomy and physiology of the major organ systems.

Course Objectives

- Classify living organisms and assess their effect of the biosphere.
- Describe the chemical composition of cells and analyze the various processes that happen at the cellular level.
- State the different types of cells and distinguish between mitosis and cytokinesis.
- Compare and contrast the Mendelian and chromosomal patterns of inheritance.
- Enumerate the various applications of genomics and biotechnology.
- Trace the evolution of plants.
- Analyze the physical structure of plants and the process of transport of nutrients in plants.
- Analyze the reproductive strategies of angiosperms.
- Trace the evolution of invertebrates and create a table showing different classes of invertebrates.
- Summarize the evolution of vertebrates from the Paleozoic era, and the evolution of humans from primates.
- Give an overview of the different functional systems and distinguish between the circulatory systems of invertebrates and vertebrates.
- Outline the processes of ingestion and excretion in animals.
- Explain the function of the sensory organs and describe the central and peripheral nervous systems.
- Describe the respiratory organs and summarize the process of respiration in animals.

Course Prerequisites

There are no prerequisites to take Introduction to Biology.

Important Terms

In this course, different terms are used to designate tasks:

- **Proctoring**: all final exams require proctoring which can be completed conveniently from your home. A webcam is required.
- **Tutoring**: memberships include online tutoring for students to access with any content/subject related questions in the place of faculty. If your tutor is not able to answer your questions please contact a student advisor.
- **Practice Quiz**: Non-graded quizzes that help highlight the content which will be assessed on graded exams.
- **Graded Exam**: A graded online assessment.

Academic Integrity Statement

Academic integrity is the pursuit of scholarly activity in an honest, truthful and responsible manner. Violations of academic integrity include, but are not limited to, plagiarism, cheating, fabrication and academic misconduct. Failure to comply with the Academic Integrity Policy can result in a failure and/or zero on the attempted assignment/examination, a removal from the course, disqualification to enroll in future courses, and/or revocation of an academic transcript.

Course Completion Policy

In order for a course to be considered complete, all required coursework must be attempted, submitted, and graded. Required coursework consists of graded assignments. Any Academic Integrity Policy violations may prevent a course from being considered complete.

Course Evaluation Criteria

Your score provides a percentage score and letter grade for each course. A passing percentage is **70%** or higher.

There are a total of 1000 points in the course:

Topic	Assessment	Points
3	Graded Exam 1	125
6	Graded Exam 2	125
6	Midterm Exam	200
9	Graded Exam 3	125

Topic	Assessment	Points
13	Graded Exam 4	125
14	Cumulative Final Exam	300
Total		1000

Course Topics and Objectives

Topics	Topic	Subtopics	Objectives
1	Introduction to Biology	• Characteristics of Living Things • The Biosphere • Classification of Living Things	• Compare and contrast living and non-living things. • Describe the biosphere and assess the effect of the human population on it. • Classify living things into categories based on different criteria.
2	Cellular Chemistry	• Chemical Composition of Cells • Metabolism • Photosynthesis • Cellular Respiration	• Describe the chemical composition of cells and recognize the interactions between the constituent elements. • Analyze the chemical reactions and energy transformations in a cell. • Summarize the process of photosynthesis. • Associate chemical reactions with different sub-processes in cellular respiration.
3	Cell Biology	• Cell Structure • Cellular Division	• Identify the different types of cells and their characteristics. • Analyze the structure of cell components with respect to their functions. • Contrast the stages of the cell cycle. • Distinguish between mitosis and cytokinesis.
4	Genetics: Gene Expression, Genomics, and Biotechnology	• DNA Structure • Meiosis and Sexual Reproduction • Patterns of Inheritance • Genes: Activity and Mutations	• Describe the structure of DNA and its modes of replication. • Summarize the process and phases of meiosis. • Describe the theory of Mendelian patterns of inheritance and

Topics	Topic	Subtopics	Objectives
		• Applications of Biotechnology • Genomics	examine it for lapses and shortcomings. • Compare and contrast the Mendelian and chromosomal patterns of inheritance. • Explain the process of gene mutations and its effects. • State the various applications of biotechnology. • Identify the applications of genomics and gene therapy.
5	Plant Biology	• Physical Structure of Plants • Nutrition • Plant Responses to Stimuli • Strategies for Plant Reproduction • Types of Fruits and Seeds • Dispersal Mechanisms • Asexual Reproduction	• Analyze the physical structure of a plant. • Analyze the process of intake and transport of nutrients by plants. • Associate movements and changes in plants to the corresponding stimuli. • Analyze the reproductive strategies of angiosperms. • Distinguish between types of seeds and fruits. • Explain seed dispersal mechanisms in angiosperms. • Elaborate on asexual reproduction in plants and its application in tissue culture and genetic engineering.
6	Evolution and Diversity: Prokaryotes, Protists, Fungi and Plants	• Microbiology • Plant Evolution • Classes of Plants	• Describe microscopic organisms like viruses and bacteria. • Describe the difference between gene regulation in prokaryotes and eukaryotes. • Compare and contrast fungi and plants. • Trace the evolution of plants to current forms. • Classify plants into different categories.
7	Evolution and Diversity: Invertebrates	• Classification of Invertebrates • Common Invertebrates • Evolution of Invertebrates	• Identify the different criteria for the classification of animals. • Discuss basic characteristics that define animals and identify invertebrates that display these characteristics.

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			• Discuss different classes of invertebrates and their functional systems. • Develop a graphical representation of major evolutionary changes in invertebrates.
8	Evolution and Diversity: Vertebrates	• Chordates • Types of Vertebrates • Evolution of Vertebrates • Human Evolution	• Identify the major characteristics of chordates. • Associate different classes of vertebrates with their environments and lifestyles. • Trace the evolution of vertebrates from the Paleozoic era to the current era. • Summarize the evolution of primates into humans.
9	Introduction to Functional Systems: The Cardiovascular System and the Immune System	• Overview of Functional Systems • Circulatory Systems in Invertebrates • Circulatory Systems in Vertebrates • Characteristics of Blood • The Immune System	• Tabulate the different functional systems in the body. • Describe the circulatory systems in invertebrates. • Describe the circulatory systems in vertebrates. • Distinguish between the components of blood with respect to appearance and functions. • Separate and sequence the steps taken by the body to defend itself against pathogens.
10	Digestive and Excretory Systems	• The Digestive Tract • Enzymes as Digestive Agents • The Excretory Organs • The Urinary System	• Describe the animal digestive tract and classify animals based on the digestive tract. • Explain how enzymes react chemically to aid digestion. • Analyze the functioning of the organs of excretions and the process of body fluid regulation. • Describe the urinary system in humans and homeostasis.
11	Sensory and Nervous Systems	• The Sensory Organs • Nervous Tissue • The Central and Peripheral Nervous Systems	• Describe the chemical, visual, and hearing and balance sensory organs and their construction. • Analyze the structure of nervous tissue and its function. • Describe the components of the central and peripheral nervous

Topics	Topic	Subtopics	Objectives
			systems and their functions.
12	Respiratory Systems	• Organs and Surfaces Used For Respiration • The Human Respiratory System • Respiratory Diseases	• Identify the respiratory organs and surfaces in animals which allow exchange of gases. • Describe the human respiratory system. • Associate disorders and infections in the respiratory tract with their causes and symptoms.
13	Behavior and Ecology	• Behavioral, Population, and Community Ecology • Ecosystems	• Compare the genetic and environmental influences of animal behavior. • Identify the patterns of population growth. • Summarize how different cycles affect the energy flow of an ecosystem. • Describe different types of ecosystems.
14	Review		• Review

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