

Introduction to Biology with Lab

Course Text/Materials

- Mader, Sylvia S. Inquiry into Life, 12th edition, McGraw-Hill, 2008, ISBN: 9780073309330 [find and buy the text: Straighterline.com/textbooks]
- Custom Lab Kit from eScienceLabs.com (please use the "find my kit" button) which is \$98.00; please enter this code [SLKIT1399] to ensure that you purchase the correct Lab.

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 with Lab.

Important Terms

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

- **Practice Exercise:** A non-graded assignment to assist you in practicing the skills discussed in a topic.
- **Exam:** A graded online test.
- **Labs:** These are experiments at home that you will complete and be assessed on through online exercises.

Course Evaluation Criteria

StraighterLine does not apply letter grades. Students earn a score as a percentage of 100%. A passing percentage is 70% or higher.

If you have chosen a Partner College to award credit for this course, your final grade will be based upon that college's grading scale. Only passing scores will be considered by Partner Colleges for an award of credit.

There are a total of 1000 points in the course*:

Topic	Assessment	Points
1	Graded Exam 1	25
1	Lab: The Scientific Method	50
2	Graded Exam 2	25
3	Graded Exam 3	25
3	Lab: Cell Structure & Function	50
3	Lab: Energy and Photosynthesis	50
3	Lab: Mitosis	50
4	Graded Exam 4	25
4	Lab: Mendelian Genetics	50
5	Graded Exam 5	25
6	Graded Exam 6	25
7	Graded Exam 7	25
	Midterm Exam (Topics 1-7)	100
8	Graded Exam 8	25
9	Graded Exam 9	25
10	Graded Exam 10	25
10	Lab: Population Genetics & Evolution	50
10	Lab: Ecology of Organisms	50
11	Graded Exam 11	25
12	Graded Exam 12	25
13	Graded Exam 13	25
14	Graded Exam 14	25
	Final Exam (Topics 8-14)	200
Total		1000

*Please note that there are non-graded but required activities and assignment uploads within this course. Uploads required include lab exercises (Word documents) and digital photographs of laboratory exercises. If these files are not submitted StraighterLine will not be able to provide students a final grade.

Course Topics and Objectives

Topics	Topic	Subtopics	Objectives
1	Introduction to Biology	<ul style="list-style-type: none"> • Characteristics of Living Things • The Biosphere • Classification of Living Things 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Chemical Composition of Cells • Metabolism • Photosynthesis • Cellular Respiration 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Cell Structure • Cellular Division 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> ● DNA Structure ● Meiosis and Sexual Reproduction ● Patterns of Inheritance 	<ul style="list-style-type: none"> ● 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 examine it for lapses and shortcomings. ● Compare and contrast the Mendelian and chromosomal patterns of inheritance.
5	Genomics and Biotechnology	<ul style="list-style-type: none"> ● Genes: Activity and Mutations ● Applications of Biotechnology ● Genomics 	<ul style="list-style-type: none"> ● Describe and differentiate between gene regulation in prokaryotes and eukaryotes. ● Explain the process of gene mutations and its effects. ● State the various applications of biotechnology. ● Identify the applications of genomics and gene therapy.
6	Plant Evolution and Diversity	<ul style="list-style-type: none"> ● Microbiology ● Plant Evolution ● Classes of plants 	<ul style="list-style-type: none"> ● Discuss microscopic organisms like viruses and bacteria. ● Compare and contrast fungi and plants. ● Trace the evolution of plants to current forms. ● Classify plants into different categories.

7	Plant Biology	<ul style="list-style-type: none"> ● Physical Structure of Plants ● Nutrition ● Plant Responses to Stimuli 	<ul style="list-style-type: none"> ● 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.
8	Plant Reproduction	<ul style="list-style-type: none"> ● Strategies for Reproduction ● Types of Fruits and Seeds ● Dispersal Mechanisms ● Asexual Reproduction 	<ul style="list-style-type: none"> ● 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.

9	Invertebrates	<ul style="list-style-type: none"> ● Classification of Invertebrates ● Common Invertebrates ● Evolution of Invertebrates 	<ul style="list-style-type: none"> ● Identify the different criteria for the classification of animals. ● Discuss basic characteristics that define animals and identify invertebrates that display these characteristics. ● Discuss different classes of invertebrates and their functional systems. ● Develop a graphical representation of major evolutionary changes in invertebrates.
10	Vertebrates	<ul style="list-style-type: none"> ● Chordates ● Types of Vertebrates ● Evolution of Vertebrates ● Human Evolution 	<ul style="list-style-type: none"> ● 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.

11	Introduction to Functional Systems: The Cardiovascular System and the Immune System	<ul style="list-style-type: none"> ● Overview of Functional Systems ● Circulatory Systems in Invertebrates ● Circulatory Systems in Vertebrates ● Characteristics of Blood ● The Immune System 	<ul style="list-style-type: none"> ● 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 the body to defend itself against pathogens.
12	Digestive and Excretory Systems	<ul style="list-style-type: none"> ● The Digestive Tract ● Enzymes as Digestive Agents ● The Excretory Organs ● The Urinary System 	<ul style="list-style-type: none"> ● 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.

13	Sensory and Nervous Systems	<ul style="list-style-type: none"> • The Sensory Organs • Nervous Tissue • The Central and Peripheral Nervous Systems 	<ul style="list-style-type: none"> • 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 systems and their functions.
14	Respiratory Systems	<ul style="list-style-type: none"> • Organs and Surfaces Used For Respiration • The Human Respiratory System • Respiratory Diseases 	<ul style="list-style-type: none"> • 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.
15	Review		<ul style="list-style-type: none"> • Review