

**Course Title: General Biology**

**Topic/Concept: The Science of Life**

**Time Allotment: 4 Days**

**Unit Sequence: 1**

**Major Concepts to be learned:**

1. Themes of Biology
2. The World of Biology
3. Microscopy & Measurement

**Expected Skills to be demonstrated:**

1. List six unifying themes of biology
2. Explain how organisms get the energy they need to survive
3. Describe the main differences between the structure of a living thing and that of a nonliving thing
4. List six characteristics of life
5. Describe how a living thing is organized
6. Explain why all living things on earth are not yet well understood
7. Define and give examples of observing, measuring, organizing, and analyzing data, inferring, and modeling
8. Explain the relationship between hypothesizing, predicting, and experimenting
9. Explain why good communications is so important in science
10. Describe the methods scientists use in their work
11. Compare light microscopes with electron microscopes in terms of magnification and resolution
12. Explain the advantages of the Systeme International d'Unites

**PA Standards/Anchors:**

**Eligible Content:**

3.1. A

- 3.1.B. A 1-9

**Instructional Strategies:**

**Assessments:**

Lecture	Group discussion
Written work	Note Taking
Graphic organizers	Charting
Summarizing	Specific Reading

- Questioning
- Review discussion
- Homework
- Exam

**Course Title: General Biology**

**Topic/Concept: Chemistry for Biology**

**Time Allotment: 4 Days**

**Unit Sequence: 2**

**Major Concepts to be learned:**

1. Composition of Matter
2. Energy
3. Solutions

**Expected Skills to be demonstrated:**

- |  |  |
|--|--|
| <ol style="list-style-type: none"><li>1. Define element, atom, compound, and molecule</li><li>3. Explain what determines an atom's stability</li><li>5. List the three states of matter, and explain how matter can change state</li><li>7. Explain how enzymes affect chemical reactions in organisms</li><li>9. Define solution, solute, solvent, and concentration</li><li>11. Contrast properties of acids and bases</li></ol> | <ol style="list-style-type: none"><li>2. Draw a model of the structure of an atom</li><li>4. Contrast ionic and covalent bonds</li><li>6. Describe how energy changes and involved in chemical reactions</li><li>8. Explain what a redox reaction is</li><li>10. Explain the dissociation of water.</li><li>12. Describe the use of the ph scale<br/>Explain the action of buffers</li></ol> |
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**PA Standards/Anchors:**

**Eligible Content:**

- 3.1.A  
3.2. A  
3.2. B

- 3.1.B.A 1, 2, 5, 9
- 3.2.B.A6
- 3.2.B.B7

**Instructional Strategies:**

**Assessments:**

- |                    |                    |
|--------------------|--------------------|
| Cooperative groups | Lecture            |
| Group discussion   | Performance task   |
| Written work       | Oral presentation  |
| Note Taking        | Graphic organizers |
| Charting           | Summarizing        |
| Specific Reading   |                    |

- Group discussions
- Homework & Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Biochemistry**

**Time Allotment: 4 Days**

**Unit Sequence: 3**

**Major Concepts to be learned:**

1. Water
2. Carbon Compounds
3. Molecules of Life

**Expected Skills to be demonstrated:**

1. Describe the structure of a water molecule
2. Explain how water's polar nature affects its ability to dissolve substances
3. List two of water's properties that result from hydrogen bonding
4. Define organic compound and name three elements often found in organic compounds
5. Explain why carbon forms so many different compounds
6. Define functional group and explain its significance
7. Compare a condensation reaction with hydrolysis
8. Define monosaccharides, disaccharide, and polysaccharide, and discuss their significance to organisms
9. Relate the sequence of a known protein to the structure of proteins
10. Relate the structure of lipids to their functions.
11. List two essential functions of nucleic acids

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.2. A
- 3.3. A
- 3.3. B

- 3.1.B. A5, 7, 8, 9
- 3.2.B.A6
- 3.3.B.A.8
- 3.3.B.B.3

**Instructional Strategies:**

**Assessments:**

- |                    |                  |
|--------------------|------------------|
| Lecture            | Group discussion |
| Written work       | Note Taking      |
| Graphic organizers | Charting         |
| Summarizing        | Evaluating       |
| Specific Reading   |                  |

- Discussions
- Questioning sessions
- Quiz
- Homework & Review
- Exam

**Course Title:** General Biology

**Topic/Concept:** Structure & Function of the Cell

**Time Allotment:** 4 Days

**Unit Sequence:** 4

**Major Concepts to be learned:**

1. Introduction Two the Cell
2. Parts of the Eukaryotic Cell
3. Multicellular Organization

**Expected Skills to be demonstrated:**

1. Outline the discoveries that led to the development of the cell theory
2. Describe the relationship between cell shape and cell function
3. Describe the structure, composition, and function of the cell membrane
4. 9. Describe the three structures characteristic of plant cells
5. Describe the structure and function of the nucleus
6. 10. Describe the features of a colonial organism
7. Distinguish between tissues, organs, and organ systems
8. Name the major organelles found in a eukaryotic cell, and describe their functions
9. State to sell ferry/Identify a limiting factor on the size of cells
10. Distinguish between prokaryotes and eukaryotes

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.1. B
- 3.1. C

- 3.1.B.A.1, 3, 5-8
- 3.1.B.B5, 6
- 3.1.B2-4

**Instructional Strategies:**

**Assessments:**

- |                    |                  |
|--------------------|------------------|
| Cooperative groups | Lecture          |
| Group discussion   | Performance task |
| Written work       | Note Taking      |
| Graphic organizers | Summarizing      |
| Specific Reading   |                  |

- Question, Answer, & Discussion
- Homework
- Worksheets
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Homeostasis & Transport**

**Time Allotment: 4 Days**

**Unit Sequence: 5**

**Major Concepts to be learned:**

1. Cell Energy Usage
2. Passive Transport
3. Active Transport

**Expected Skills to be demonstrated:**

1. Explain how and equilibrium is established as a result of confusion
2. Distinguish between diffusion and osmosis
3. Explain how substances across the cell membrane through facilitated diffusion
4. Explain how ion channels assist the diffusion of the ions across the cell membrane
5. Distinguish between passive transport an active transport
6. Explain how the sodium-potassium pump operates
7. Compare and contrast endocytosis and exocytosis

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.2. A
- 3.2. B

- 3.1.B.A2, 5, 8, 9
- 3.2.B.A6
- 3.2.B.B3

**Instructional Strategies:**

**Assessments:**

- |                    |                  |
|--------------------|------------------|
| Cooperative groups | Lecture          |
| Performance task   | Written work     |
| Note Taking        | Summarizing      |
| Evaluating         | Specific Reading |

- Question, Answer, and Discussion
- Homework
- HomeworkWorksheets
- Exams

**Course Title: General Biology**

**Topic/Concept: Photosynthesis**

**Time Allotment: 4 Days**

**Unit Sequence: 6**

**Major Concepts to be learned:**

1. Capturing the Energy in Light
2. The Light Cycle
3. The Calvin Cycle

**Expected Skills to be demonstrated:**

1. Explain how the structure of the chloroplast relates to its function
2. Describe the role of chlorophylls and other pigments in photosynthesis
3. Summarize the main events of electron transport
4. Describe what happens to a water molecule in photosynthesis
5. Explain how ATP is synthesized during the light reactions
6. Summarize the main events of the Calvin cycle
7. Describe what happens to the compounds made in the Calvin cycle
8. Distinguish between C<sub>3</sub>, C<sub>4</sub>, and CAM plants
9. Explain how environmental factors influence photosynthesis

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.2. A
- 3.2. B
- 3.3. A

- 3.1.B.A1, 2, 5, 7-9
- 3.2.B.A6
- 3.2.B.B7
- 3.3.B.A8

**Instructional Strategies:**

**Assessments:**

- |                    |                   |
|--------------------|-------------------|
| Cooperative groups | Lecture           |
| Group discussion   | Research          |
| Written work       | Hands-on activity |
| Note Taking        | Summarizing       |
| Specific Reading   |                   |

- Questions, Answers, & Discussion
- Lab Work
- Homework & Worksheets
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Glycolysis & Fermentation**

**Time Allotment: 4 Days**

**Unit Sequence: 7**

**Major Concepts to be learned:**

1. Glycolysis & Fermentation
2. Aerobic Respiration
3. Fermentation in Industry

**Expected Skills to be demonstrated:**

1. Defined cellular respiration
2. Describe the major events in glycolysis
3. Compare and control lactic acid fermentation and alcoholic fermentation
4. Calculate the efficiency of glycolysis
5. Summarize the events of the Krebs cycle
6. Summarize the events of the electron transport chain
7. Relate aerobic respiration to the structure of a mitochondrion
8. Calculate the efficiency of aerobic respiration

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.2. A
- 3.3. A

- 3.1.B.A1, 2, 5, 7-9
- 3.2.B.A6
- 3.3.B.A8

**Instructional Strategies:**

**Assessments:**

- |                    |                   |
|--------------------|-------------------|
| Cooperative groups | Lecture           |
| Group discussion   | Performance task  |
| Written work       | Hands-on activity |
| Oral presentation  | Note Taking       |
| Summarizing        | Evaluating        |
| Specific Reading   |                   |

- Questions, Answers, & Discussion
- Homework & Worksheets
- Student presentations
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Chromosomes**

**Time Allotment: 4 Days**

**Unit Sequence: 8**

**Major Concepts to be learned:**

1. Chromosomes
2. Cell Division
3. Meiosis

**Expected Skills to be demonstrated:**

1. Describe the structure of a chromosome
2. Compare prokaryotic chromosomes with eukaryotic chromosomes
3. Explain the differences between sex chromosomes and autosomes
4. Give examples of diploid and haploid cells
5. Compare the end products of mitosis with those of meiosis
6. Describe the events of binary fission
7. Explain crossing-over and how it contributes to the production of unique individuals
8. Describe each phase of the cell cycle
9. Summarize the major characteristics of spermatogenesis and oogenesis
10. Summarize the phases of mitosis
11. Compare cytokinesis animal cells with cytokinesis in plant cells
12. List and describe the phases of meiosis

**PA Standards/Anchors:**

**Eligible Content:**

3.1. A  
3.1. B

- 3.1.B.A1,3, 4, 6, 8, 9
- 3.1.B.B1-6

**Instructional Strategies:**

**Assessments:**

Cooperative groups      Lecture  
Group discussion      Written work  
Hands-on activity      Note Taking  
Graphic organizers      Summarizing  
Specific Reading

- Questions, answers, and Discussion
- Homework & Worksheets
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Fundamentals of Genetics**

**Time Allotment: 4 Days**

**Unit Sequence: 9**

**Major Concepts to be learned:**

1. Mendel's Legacy
2. Genetic Crosses
3. Predicting Genetic Crosses

**Expected Skills to be demonstrated:**

1. Describe the steps involved in Mendel's experiments on garden peas
2. Distinguish between dominant and recessive traits
3. State two laws of heredity that were developed from Mendel's work
4. Explain the difference between an allele and a gene
5. Describe how Mendel's results can be explained by scientific knowledge of genes and chromosomes
6. Explain how probability is used to predict the results of genetic crosses
7. Use a Punnett square to predict the results of monohybrid and dihybrid genetic crosses
8. Explain how a testcross is used to show the genotype of an individual whose phenotype is dominant
9. Differentiate a monohybrid cross from a dihybrid cross

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C

- 3.1.B.A1, 4, 5, 9
- 3.1.B.B1-6
- 3.3.B.A.8

**Instructional Strategies:**

**Assessments:**

Cooperative groups	Problem solving activities
Lecture	Group discussion
Written work	Hands-on activity
Note Taking	Graphic organizers
Charting	Specific Reading

- Homework
- Discussions, worksheet, and presentations
- Review
- Quiz
- Exam

**Course Title:** General Biology

**Topic/Concept:** Nucleic Acids And Protein Synthesis

**Time Allotment:** 4 Days

**Unit Sequence:** 10

**Major Concepts to be learned:**

1. DNA
2. RNA
3. Protein Synthesis

**Expected Skills to be demonstrated:**

1. Explain the principal function of DNA
2. Explain the role of complementary base pairing in the replication of DNA
3. Explain the primary functions of RNA
4. Describe the structure and function of each type of RNA
5. Describe the structure of DNA Define the term complementary base pairing
6. Explain the roles of the start codon and stop condons
7. Distinguish between a codon and an anticodon, and state where each is found
8. Summarize the main features of DNA replication
9. Compare the structure of RNA with that of DNA
10. Summarize the process of transcription
11. Describe the genetic code
12. Summarize the process of translation

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.2.A

- 3.1.B.A2, 5, 7, 9
- 3.1.B.B.1-6
- 3.1.B.A1, 4
- 3.2.B.A6

**Instructional Strategies:**

**Assessments:**

Cooperative groups	Problem solving activities
Lecture	Group discussion
Written work	Hands-on activity
Graphic organizers	Summarizing
Specific Reading	

- Discussion
- Work sheets and homework
- Review
- Quiz
- Exam

**Course Title: General Biology**

**Topic/Concept: Gene Expression**

**Time Allotment: 4 Days**

**Unit Sequence: 11**

**Major Concepts to be learned:**

1. Control of Gene Expression
2. Gene Expression & Development
3. The War on Cancer

**Expected Skills to be demonstrated:**

1. Define the term gene expression.
2. Describe the regulation of the lac operon in prokaryotes
3. Distinguish between introns and exons.
4. Describe the role of enhancers in the control of gene expression.
5. Recognize the relationship between gene expression and morphogenesis
6. Describe the influence of homeotic genes on Drosophila development
7. Summarize the role of the homeobox in eukaryotic development
8. List the key characteristics of cancer cells
9. Compare and contrast the roles of oncogenes and tumor-suppression genes

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.2.A

- 3.1.B.A2, 5, 7, 9
- 3.1.B.B.1-6
- 3.2.B.A6

**Instructional Strategies:**

**Assessments:**

Cooperative groups	Lecture
Group discussion	Written work
Graphic organizers	Summarizing
Evaluating	

- Discussions
- Homework and worksheets
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Inheritance Patterns And Human Genetics**

**Time Allotment: 4 Days**

**Unit Sequence: 12**

**Major Concepts to be learned:**

1. Chromosomes and Inheritance
2. Human Genetics

**Expected Skills to be demonstrated:**

1. Detecting Human Genetic Disorders
2. Describe how sex linkage affects the inheritance of traits
3. Summarize the procedure involved in constructing a chromosome map
4. Show how pedigree analysis can be used to illustrate the inheritance of traits
5. Give examples of traits or disorders transmitted by autosomal dominant, autosomal recessive, polygenic, and X-linked recessive inheritance
6. Compare sex-linked traits with sex-influenced traits
7. Explain how nondisjunction can cause human genetic disorders
8. Explain the effect of crossing-over on the inheritance of genes in linkage groups
9. Distinguish between chromosome mutations and gene mutations
10. Explain the role of sex chromosomes in sex determination
11. Explain the inheritance of ABO blood groups

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A 3.1.B 3.1.C 3.2.A	<ul style="list-style-type: none"><li>• 3.1.B.A2, 5, 7, 9</li><li>• 3.1.B.B.1-6</li><li>• 3.2.B.A6</li></ul>
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**Instructional Strategies:**

**Assessments:**

Cooperative groups Group discussion Note Taking Charting Specific Reading	Lecture Written work Graphic organizers Summarizing	<ul style="list-style-type: none"><li>• Discussions</li><li>• Questioning &amp; Answer Session</li><li>• Homework &amp; worksheets</li><li>• Quiz</li><li>• Exam</li></ul>
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**Course Title: General Biology**

**Time Allotment: 4 Days**

**Topic/Concept: DNA Technology**

**Unit Sequence: 13**

**Major Concepts to be learned:**

1. The New Genetics
2. DNA Technology Techniques
3. Practical Uses of DNA Technology

**Expected Skills to be demonstrated:**

1. Define genetic engineering
2. Explain how restriction enzymes can be used to make recombinant DNA
3. Explain how cloning vectors can be used to clone and transfer genes
4. List the steps in a gene-transfer experiment
5. Explain what a DNA fingerprint is and how it is prepared
6. Distinguish between the following laboratory techniques: RFLP analysis, gel electrophoresis, and polymerase chain reaction
7. Describe the purpose of the Human Genome Project and the potential uses of the information collected in the project
8. Explain how gene therapy may be used in humans
9. Explain how DNA technology can be used to produce medical products
10. Describe some ways that DNA technology can be used to improve crop yields and the food supply
11. Discuss some environmental and ethical issues in genetic engineering
12. Explain how DNA technology can be used to produce medical products
13. Describe some ways that DNA technology can be used to improve crop yields and the food supply
14. Discuss some environmental and ethical issues in genetic engineering

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.2.A

- 3.1.B.A2, 5, 7, 9
- 3.1.B.B.1-6
- 3.2.B.A6

**Instructional Strategies:**

**Assessments:**

Lecture	Group discussion
Research	Written work
Oral presentation	Note Taking
Graphic organizers	Charting
Summarizing	Specific Reading

- Report & oral presentation
- Discussion
- Homework & Worksheets
- Quiz
- Exam

**Course Title: General Biology**

**Topic/Concept: Origin of Life**

**Time Allotment: 4 Days**

**Unit Sequence: 14**

**Major Concepts to be learned:**

1. Biogenesis
2. Earth's History
3. The First Life-Forms

**Expected Skills to be demonstrated:**

1. Define spontaneous generation, and list some of the observations that led people to think that life could arise from nonliving things
2. Summarize the result of experiments by Redi and by Spallanzan that tested the hypothesis of spontaneous generation
3. Summarize the concept of half-life
4. Describe the production of organic compounds in the Miller-Urey apparatus
5. Summarize the possible importance of cell-like structures produced in the laboratory
6. Explain the importance of the chemistry of RNA in relation to the origin of life
7. List three inferred characteristics that describe the first forms of cellular life on Earth
8. Name two types of autotrophy and explain the difference between them
9. Explain how photosynthesis and aerobic respiration are thought to be related
10. Define endosymbiosis, and explain why it is important in the history of eukaryotes

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.3.B

- 3.1.B.A1, 3, 8, 9
- 3.1.C1-4
- 3.2.B.A6
- 3.3.B.B3
- 3.1.B.B1, 3-6

**Instructional Strategies:**

**Assessments:**

Cooperative groups      Lecture  
Group discussion      Written work  
Charting      Summarizing  
Specific Reading

- Small group discussion
- Homework & worksheets
- Review
- Quiz
- Exam

**Course Title: General Biology**

**Topic/Concept: Evolution: Evidence and Theory**

**Time Allotment: 4 Days**

**Unit Sequence: 15**

**Major Concepts to be learned:**

1. The Fossil Record
2. Theories of Evolution
3. Evolution in Process

**Expected Skills to be demonstrated:**

1. Define fossil, and tell how the examination of fossils led to the development of evolutionary theories
2. Explain the law of superposition and its significance to evolutionary theory
3. Describe how early scientists inferred a succession of life-forms from the fossil record
4. Tell how biogeographic observations suggest descent with modification
5. Define evolution Explain Lamarck's theory of evolution, and describe how it was flawed
6. List some of the evidence that led Darwin to his idea of how species might change over time
7. Explain Darwin's two major theories
8. Describe the difference between homologous, analogous, and vestigial structures
9. Tell how similarities in macromolecules and embryos of different species suggest a relationship between them
10. Explain the difference between coevolution, and divergent and convergent evolution

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.3.B

- 3.1.B.A1, 3, 8, 9
- 3.1.C1-4
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

Lecture                      Group discussion  
Written work                Note Taking  
Graphic organizers        Charting  
Specific Reading

- Group discussions
- Questioning & Answers
- Homework & worksheets
- Review
- Exam

**Course Title: General Biology**

**Time Allotment: 4 Days**

**Topic/Concept: The Evolution of Populations and Speciation**

**Unit Sequence: 16**

**Major Concepts to be learned:**

1. Genetic Equilibrium
2. Disruption of Genetic Equilibrium
3. Formation of Species

**Expected Skills to be demonstrated:**

1. Explain the importance of the bell curve to population genetics
2. Explain how to compute allele frequency and phenotype frequency
3. List five conditions that can cause evolution to take place
4. Define genetic drift, and tell how it affects endangered species
5. Give an example of sexual selection
6. Define geographic isolation, and explain how it can lead to speciation
7. Explain the difference between the morphological concept of species and the biological species concept
8. Summarize the punctuated equilibrium hypothesis, and contrast it with the hypothesis of gradual change
9. Contrast the effects of stabilizing, directional, & disruptive selection on variations in a trait
10. Name three kinds of reproductive isolation
11. Describe two causes of genotypic variation in a population
12. Explain Hardy-Weinberg genetic equilibrium
13. Give an example of how migration can affect evolution

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.3.B

- 3.1.B.B1, 3-6
- 3.1.C1-4

**Instructional Strategies:**

**Assessments:**

Cooperative groups	Lecture
Group discussion	Written work
Note Taking	Graphic organizers
Charting	Summarizing
Specific Reading	

- Discussion
- Homework & worksheets
- Review
- Quiz
- Exam

**Course Title: General Biology**

**Time Allotment: 4 Days**

**Topic/Concept: Origin and Evolution of Mammals**

**Unit Sequence: 17**

**Major Concepts to be learned:**

1. Key characteristics
2. Characteristics of mammals
3. Mammalian Classification

**Expected Skills to be demonstrated:**

1. Name and describe six characteristics of mammals
2. Describe the characteristics of the early synapsis
3. Summarize the importance of therapsids in mammalian evolution
4. Describe how dinosaurs effected the evolution of mammals
5. Describe the advantage of endothermy in mammals
6. Describe two features of the mammalian respiratory and circulatory systems that help sustain a rapid metabolism
7. Describe two mammalian adaptations for digesting plants
8. Compare and contrast reproduction and monotremes, marsupials, and placental mammals
9. Name the orders of mammals, and give an example of each
10. Describe two differences between marsupials and monotremes
11. Distinguish between artiodactyls and perissodactyls
12. Identify two orders whose members are aquatic, and describe one adaptation for aquatic life shown by each order

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.1. C
- 3.3. A
- 3.3. B

- 3.1.B.A1, 4, 5, 8, 9
- 3.1.B.C1-4
- 3.3.B.A8
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

- |                    |                            |
|--------------------|----------------------------|
| Cooperative groups | Problem solving activities |
| Lecture            | Group discussion           |
| Research           | Written work               |
| Note Taking        | Graphic organizers         |
| Charting           | Summarizing                |
| Evaluating         | Specific Reading           |

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Human Evolution**

**Time Allotment: 4 Days**

**Unit Sequence: 18**

**Major Concepts to be learned:**

1. The Study of Human Origins
2. Africa: Cradle of Humanity
3. Fossil Evidence of Hominid Evolution
4. Hypothesis of Hominid Evolution

**Expected Skills to be demonstrated:**

1. Describe how paleoanthropologists gather evidence of human ancestry
2. List some traits shared by all primates
3. Name two distinguishing characteristics of anthropoids
4. Give examples of traits unique to humans
5. Explain how the discovery of Lucy changed hypotheses about the evolution of bipedalism
6. Explain the significance of finding fossils of hominids that are not ancestral to modern humans
7. List the fossil finds of 1995, and discuss their significance regarding the evolution of bipedalism in hominids
8. Name two behavioral advances made by Homo species
9. Contrast the multiregional hypothesis of the evolution of modern humans with the hypothesis of recent African origin
10. Describe where Neanderthals are placed on the hominid phylogenetic tree

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.3.B

- 3.1.B.B1, 3-6
- 3.1.C1-4

**Instructional Strategies:**

**Assessments:**

Lecture                      Group discussion  
Research                     Written work  
Note Taking                 Graphic organizers  
Charting                      Evaluating  
Specific Reading

- Discussion & group brain storming
- Homework & worksheets
- Review
- Quiz
- Exam

**Course Title: General Biology**

**Topic/Concept: Classification**

**Time Allotment: 4 Days**

**Unit Sequence: 19**

**Major Concepts to be learned:**

1. History of Taxonomy
2. Modern Phylogenetic Taxonomy To Modern Systems of Classification

**Expected Skills to be demonstrated:**

1. Describe Aristotle’s classification system, and explain why it was replaced
2. Explain Linnaeus’s system of classification, and identify the main criterion he used to classify organisms
3. List Linnaeus’s levels of classification from the most general to the most specific
4. Name the primary criterion that modern taxonomists consider when they classify an organism
5. Define phylogenetic tree, and explain what information a phylogenetic tree shows
6. List four types of evidence used to organize organisms in systematic taxonomy
7. Name two differences found in the embryos of vertebrates and arthropods that suggest a very different phylogenetic history
8. Explain cladistic taxonomy, and identify one conclusion that is in conflict with classical, systematic taxonomy
9. Name the six-kingdom system of classification
10. List the characteristics that distinguish archaeobacteria from eubacteria
11. Explain why the protists are grouped together in the six-kingdom system in spite of differences greater than those between plants and animals
12. Describe the evidence that prompted the creation of the three domain system of classification
13. Explain the principal difference between the six-kingdom system and the three –domain system of classification

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.3.B

- 3.1.B.A1, 3, 6, 8, 9
- 3.1.B.C1, 3, 4

**Instructional Strategies:**

**Assessments:**

Cooperative groups      Lecture  
Group discussion      Written work  
Graphic organizers      Summarizing  
Evaluating      Specific Reading

- Discussions
- Homework & worksheets
- Review
- Quiz
- Exam

**Course Title: General Biology**

**Topic/Concept: Introduction to Ecology**

**Time Allotment: 4 Days**

**Unit Sequence: 20**

**Major Concepts to be learned:**

1. Ecology
2. Ecology of Organisms
3. The Rise and Fall of Island Species

**Expected Skills to be demonstrated:**

1. Define the term ecology, and explain why ecology is important
2. List and describe the three human-caused environmental problems
3. Identify the five different levels of organization in ecology
4. Explain the theme of interconnectedness
5. Identify the importance of models to ecology
6. Contrast abiotic factors with biotic factors, and list two examples of each
7. Explain the importance of tolerance curves
8. Describe some adaptations that allow organisms to avoid unfavorable conditions
9. Explain the concept of the niche
10. Contrast the fundamental niche with the realized niche

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.C  
3.3.B

- 3.1.B.A3-9
- 3.1.B.B5, 6
- 3.1.B.C3, 4
- 3.3.B.A8

**Instructional Strategies:**

**Assessments:**

Lecture                      Group discussion  
Written work                Note Taking  
Graphic organizers        Evaluating  
Specific Reading

- Discussion
- Homework & worksheets
- Review
- Quiz
- Exam

**Course Title: General Biology**

**Topic/Concept: Populations**

**Time Allotment: 4 Days**

**Unit Sequence: 21**

**Major Concepts to be learned:**

1. Understanding Populations
2. Measuring Populations
3. Human Population Growth

**Expected Skills to be demonstrated:**

1. Explain the differences between population size, density, and dispersion
2. Describe the three main patterns of populations dispersion
3. Explain the importance of a population's age structure
4. Contrast the three main types of survivorship curves
5. Describe the exponential model of population growth
6. Compare the similarities and differences between the logistic model and the exponential model
7. Distinguish between density-dependent and density-independent regulatory factors
8. List three reasons why small populations are more vulnerable to extinction
9. Explain how the development of agriculture changed the pattern of human population growth
10. Describe the change in human population growth that began around 1650
11. Describe how growth rates have changed since World War II
12. Compare the general standard of living in developed countries with that in developing countries

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.C  
3.3.B

- 3.1.B.B4-6
- 3.1.B.C2-4
- 3.3.B.A8

**Instructional Strategies:**

**Assessments:**

Cooperative groups      Lecture  
Group discussion      Written work  
Note Taking      Graphic organizers  
Charting      Summarizing  
Evaluating      Specific Reading

- Discussion
- Homework & worksheets
- Review
- Quiz
- Exam

**Course Title: General Biology**

**Time Allotment: 4Days**

**Topic/Concept: Community Ecology**

**Unit Sequence: 22**

**Major Concepts to be learned:**

1. Species Interactions
2. Properties of Communities
3. Succession

**Expected Skills to be demonstrated:**

1. Distinguishing predation from parasitismEvaluating the importance of mimicry as a defensive mechanism
2. Describe two ways plants defend themselves against herbivores
3. Explain how competition can affect community structure
4. Contrast mutualism with commensalism and give one example of each type of relationship
5. Explain the difference between species richness and species diversit
6. Describe how species richness varies with latitude and explain a hypothesis for this patter
7. Explain the cause and consequences of the species area-effect
8. Describe how species richness varies with latitude and explain a hypothesis for this pattern
9. Explain the cause and consequences of the species area-effect
10. Explain the two main views of the relationship between species richness and stability
11. Distinguish between primary and secondary succession
12. Identify some the characteristics of pioneer speciesDescribe the sequence of changes occurring at Glacier Bay
13. Explain the successional changes that can occur when an existing community is disrupted

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.C  
3.3.A  
3.3.B

- 3.1.B.A9
- 3.1.B.C1,3,4
- 3.3.B.A.8
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

Cooperative groups      Lecture  
Group discussion      Written work  
Note Taking      Graphic organizers  
Summarizing      Specific Reading

- Group discussions
- Homework & worksheets
- Review
- Quiz
- Exam

**Course Title: General Biology**

**Time Allotment: 4 Days**

**Major Concepts to be learned:**

1. Energy Transfer
2. Ecosystem Recycling
3. Terrestrial Ecosystems
4. Aquatic Ecosystems

**Topic/Concept: Ecosystems and the Biosphere**

**Unit Sequence: 23**

**Expected Skills to be demonstrated:**

1. Contrast producers with consumers
2. Explain the importance role of an ecosystem
3. Contrast the food web with the food chain
4. Explain why ecosystems usually contain only a few trophic levels front
5. Define biogeochemical cycleTrace the steps of the water cycle
6. Summarize the major steps in the nitrogen cycle
7. Describe the steps of the carbon cycle
8. Describe the differences between tender and taiga biomes
9. Contrast temperate grasslands with savanna
10. Describe the three water conservation adaptations of desert organisms
11. Compare tropical rain forest with temperate deciduous forests
12. Describe the differences between the erratic zone and the oceanic zone
13. Contrast the aphotic and photic zones in the ocean
14. Explain how organisms near deep-sea events obtain energy
15. Contrast you tropic lakes with oligotrophic lakes

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A            3.1.C  
3.2.A            3.3.A  
3.3.B

- 3.1.B.A9
- 3..B.A
- 3.3.B.B3
- 3.1.B.C4
- 3.3.B.A8

**Instructional Strategies:**

**Assessments:**

Lecture            Group discussion  
Written work            Note Taking  
Graphic organizers            Summarizing  
Specific Reading

- Discussions            Quiz
- Homework & worksheets            Exam
- Review

**Course Title: General Biology**

**Topic/Concept: Environmental Science**

**Time Allotment: 4 Days**

**Unit Sequence: 24**

**Major Concepts to be learned:**

1. Humans and the Environment
2. The Biodiversity Crisis
3. Taking Action

**Expected Skills to be demonstrated:**

1. Give an example of how global systems are linked together
2. Identify several effects of El Niño on human populations
3. Describe two ways that humans have modified the composition of the atmosphere and identify the possible consequences of these changes
4. Explain how future human population growth could affect the environment
5. Define biodiversity and explain three ways to measure it
6. Describe global patterns of biodiversity
7. Identify two strategies for conserving biodiversity in developing countries
8. Distinguish between utilitarian and non-utilitarian reasons for conserving biodiversity
9. Contrast conservation biology with restoration biology
10. Describe current effects to conserve migratory birds
11. Discuss the biological principles of social issues related to wolf in reintroduction
12. Explain the plan to restore the Everglades

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A	3.1.C	• 3.1.B.A9	• 3.1.B.C1-4
3.2.A	3.3.A	• 3.2.B.C3,4	• 3.3.B.A8
3.3.B		• 3.3.B.B3	

**Instructional Strategies:**

**Assessments:**

Cooperative groups	Lecture	• Review
Group discussion	Research	• Quiz
Oral presentation	Note Taking	• Homework
Graphic organizers	Charting	• Exam
Summarizing	Specific Reading	

**Course Title: General Biology**

**Topic/Concept: Bacteria**

**Time Allotment: 4 Days**

**Unit Sequence: 25**

**Major Concepts to be learned:**

1. Bacterial Evolution and Classification
2. Biology of Bacteria
3. Bacteria and Humans

**Expected Skills to be demonstrated:**

1. Define bacteria, eubacteria and archaeobacteria and note the relationship between them
2. Describe the methods used to classify bacteria
3. Name and describe three types of archaeobacteria
4. Distinguish gram-positive bacteria from gram-negative bacterians
5. Describe the significance of cyanobacteria in the formation of the Earth's present atmosphere
6. Describe the structure of the bacterial cell
7. Describe three ways that bacteria move
8. Compare the heterotrophic modes of nutrition and bacteria with autotrophic modes
9. Distinguish the various types of environments that bacteria occupy
10. List three types of genetic recombination use by bacteria
11. Describe the ways that bacteria can cause disease in humans
12. Specify how antibiotic resistance has come about and describe ways that bacteria resist antibiotics
13. List three ways that bacteria are helpful to human

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A	3.1.B	• 3.1.B.A1-9	• 3.1.B.B1,2,6
3.1.C	3.2.A	• 3.1.B.C2-4	• 3.2.B.A6
3.3.A	3.3.B	• 3.3.B.A8	• 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

Lecture	Group discussion	• Homework
Research	Written work	• Discussions
Oral presentation	Note Taking	• Quiz
Graphic organizers	Charting	• Review
Summarizing	Specific Reading	• Exam

**Course Title: General Biology**

**Topic/Concept: Viruses**

**Time Allotment: 4 Days**

**Unit Sequence: 26**

**Major Concepts to be learned:**

1. Structure
2. Viral Replication
3. Viruses and Humans Disease
4. The HIV-AIDS Virus

**Expected Skills to be demonstrated:**

1. Describe the structure and classification of viruses
2. Describe the achievement of Wendell Stanley and development of virology
3. Identify the range of sizes and shapes among viruses
4. List The characteristics used to group viruses
5. Compare and contrast her lies and prions with viruses
6. Describe a bacteriophage
7. Summarize the five phases of the lytic cycle
8. Compare the lytic and lysogenic cycles of viral replication
9. Differentiate between a prophage blondish he lytic Israeli secondary to and a pro-virus
10. Summarize how viruses may have evolved
11. Name for viral diseases that result in serious illness in humans
12. Compare the two types of viral vaccines and discuss other forms of viral disease prevention
13. Discuss the relationship between viruses and cancer
14. Outline the onset of a virus outbreak

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A	3.1.B	• 3.1.B.A2,9	• 3.1.B.B1,3,4,6
3.1.C	3.2.A	• 3.1.B.C2-4	• 3.2.B.A6
3.3.A	3.3.B	• 3.3.B.A8	• 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

Lecture	Group discussion	• Homework
Research	Written work	• Quiz
Note Taking	Graphic organizers	• Review
Summarizing	Specific Reading	• Exam

**Course Title:** General Biology

**Topic/Concept:** Protozoa

**Time Allotment:** 4 Days

**Unit Sequence:** 27

**Major Concepts to be learned:**

1. Overview of Protozoa
2. Protozoan Diversity
3. The Origin of Eukaryotic Cells

**Expected Skills to be demonstrated:**

1. Describe the characteristics of protozoa
2. Explain the role some protozoa play in aquatic ecosystems
3. Discuss a classification scheme used to identify protozoa
4. Name and adaptation that enable some protozoa to survive harsh of environmental conditions
5. Briefly explain the evolution of protozoa
6. Explain how sarcodines have contributed to Earth's geological features
7. Describe a type of sexual reproduction that occurs and ciliates
8. Identify four human diseases caused by zooflagellates
9. Discuss the lifecycle of Plasmodium

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.3.B

- 3.1.B.A3,5,8,9
- 3.1.B.B1,3,4,6
- 3.1.B.C1-4
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

Lecture	Group discussion
Research	Written work
Note Taking	Graphic organizers
Summarizing	Specific Reading

- Homework
- Quiz
- Review
- Exam

Course Title: Biology

Topic/Concept: Algae and Fungus-like Protists

Time Allotment: 4 Days

Unit Sequence: 28

**Major Concepts to be learned:**

1. Overview of Algae
2. Algal Diversity
3. Fungus-like Protists

**Expected Skills to be demonstrated:**

1. Compare algae with other protists Explain how algae differs from plants.
2. Describe the various body structures of algae
3. Identify the characteristics used to classify algae into seven phyla.
4. Summarize the events of asexual and sexual reproduction in representative genera of algae
5. Explain why the phylum Chlorophyta is considered the most diverse phylum of algae.
6. Describe the characteristics of the members of the phyla Phaeophyta and Rhodophyta.
7. Describe the essential characteristics of diatoms and explain their industrial importance
8. List the important structural characteristics associated with dinoflagellates.
9. Discuss why Euglena is considered both a protozoa and an alga.
10. Describe the two forms that characterize the lifecycle of the slime mold
11. Describe the environment in which slime molds live.
12. Outline the basic lifecycles of the two groups of slime molds
13. Point out the unique characteristics of water molds.

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A 3.1.B 3.1.C 3.3.B	<ul style="list-style-type: none"><li>• 3.1.B.A1-9</li><li>• 3.1.B. B1-3,6</li><li>• 3.1.B.C1-4</li><li>• 3.3.B.B3</li></ul>
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**Instructional Strategies:**

**Assessments:**

Lecture Written work Graphic organizers Summarizing	Group discussion Note Taking Charting Specific Reading	<ul style="list-style-type: none"><li>• Homework</li><li>• Quiz</li><li>• Review</li><li>• Exam</li></ul>
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**Course Title: General Biology**

**Topic/Concept: Fungi**

**Time Allotment: 4 Days**

**Unit Sequence: 29**

**Major Concepts to be learned:**

1. Overview of Fungi
2. Classification
3. Fungi and Humans

**Expected Skills to be demonstrated:**

1. Describe the origin and evolution of fungi
2. Compare fungi with other eukaryotic organisms
3. Describe how fungi obtain nutrients
4. Distinguish between a hypha and a mycelium
5. List the characteristics that distinguish the three phyla of fungi
6. Identify the common sexual reproductive traits of the three phyla of fungi
7. Define mycorrhiza and lichens and distinguish between them
8. Explain the importance of mycorrhiza and lichens to the environment
9. Describe three ways that fungi cause disease in humans
10. Describe the types of food that fungi provide
11. Provide examples of fungi's industrial importance

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.3.B

- 3.1.B.A1-9
- 3.1.B.B1-3,6
- 3.1.B.C1-4
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

Lecture	Group discussion
Written work	Note Taking
Graphic organizers	Charting
Summarizing	Specific Reading

- Homework
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: The Importance of Plants**

**Time Allotment: 4 Days**

**Unit Sequence: 30**

**Major Concepts to be learned:**

1. Plants and People
2. George Washington Carver: Healer of the Soil
3. Plants in an Environment

**Expected Skills to be demonstrated:**

1. Describe ways that people use plants
2. Distinguish between serial root crops legumes fruits and vegetables
3. Explain how humans have increased food production in the world
4. List three plants that are widely used in medicines
5. Define plant ecology
6. Give two examples of how plants recycle elements in the environment and explain why this recycling is essential to humans
7. Explain how plants benefit from interactions with animals
8. Explain the beneficial interactions between plants and fungi and bacteria
9. Describe how people have damaged wild plant populations

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.3.B

- 3.1.B.A1-9
- 3.1.B.B6
- 3.1.B.C1-4
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

Lecture                      Group discussion  
Written work                Note Taking  
Graphic organizers        Charting  
Summarizing                Specific Reading

- Homework
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Plant Evolution and Classification**

**Time Allotment: 4 Days**

**Unit Sequence: 31**

**Major Concepts to be learned:**

1. Overview of Plants
2. Nonvascular Plants
3. Vascular Plants

**Expected Skills to be demonstrated:**

1. Compare and contrast green algae and plants
2. Name three adaptations plants have made to life on land
3. Compare vascular plants with non-vascular plants
4. Define and describe alternation of generations
5. Name the three types of plants that make up the bryophytes
6. List the distinguishing characteristic are shared by nonvascular plants
7. Compare sporophytes in bryophytes with gametophytes and bryophytes
8. Describe the environmental importance of bryophytes
9. Name the main ways people use sphagnum moss
10. List the two main characteristics of vascular plants
11. Distinguish between seedless plants and seeded plants
12. Distinguish between gymnosperms and angiosperms
13. Summarize the adaptive advantage of seeds
14. Distinguish between monocots and dicots

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.3.B

- 3.1.B.A1-9
- 3.1.B.B1-5
- 3.1.B.C1-4
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

Problem solving activities	Lecture
Group discussion	Written work
Hands-on activity	Note Taking
Graphic organizers	Charting
Summarizing	Specific Reading

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Plant Structure and Function**

**Time Allotment: 4 Days**

**Unit Sequence: 32**

**Major Concepts to be learned:**

1. Plant Cells and Tissues
2. Roots
3. Leaves

**Expected Skills to be demonstrated:**

1. Describe the three kinds of plant cells
2. Explain the differences between the three plant tissue systems
3. Describe the Main types of meristems
4. Differentiate between monocots and I can't meristems
5. Differentiate between primary and secondary growth
6. List the three major functions of roots
7. Explain the difference between a taproot system and a fibers root system
8. Distinguish between primary growth and secondary growth in roots
9. Describe primary root tissues
10. Describe the difference between monocots stabs and dicots stems
11. Explain how annual rings are formed
12. Describe the cohesion-tension very for water movement in xylem
13. Identify the difference between a simple leave any compound wife
14. Explain the importance stomata
15. Describe adaptations of leaves for special purposes
16. Describe the tissues that make up the internal structure of a leaf

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1.A
- 3.1.B
- 3.1.C
- 3.3.B

- 3.1.B.A2-9
- 3.1.B.B6
- 3.1.B.C2-4
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

- Lecture
- Written work
- Note Taking
- Charting
- Specific Reading
- Group discussion
- Hands-on activity
- Graphic organizers
- Summarizing

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Plant Reproduction**

**Time Allotment: 4 Days**

**Unit Sequence: 33**

**Major Concepts to be learned:**

1. Plant Life Cycles
2. Sexual Reproduction in Flowering Plants
3. Dispersal and Relegation

**Expected Skills to be demonstrated:**

1. Describe the life cycle of a moss
2. Describe the lifecycle of a typical Fern
3. Describe the lifecycle of a gymnosperms
4. Identify the four main flower parts, and state the function of each
5. Describe oh deal formation and pollen formation in angiosperms
6. Relates lower structure to method of pollination
7. Describe fertilization in flowering plants
8. Name different types of fruits
9. Describe several adaptations for fruit and seed dispersal
10. Compare and contrast the structure and germination of different types of seeds
11. Recognize the advantages and disadvantages of asexual reproduction
12. Describe methods of vegetative propagation

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.3.B

- 3.1.B.A3-5,7-9
- 3.1.B.B1-6
- 3.1.B.C1-4
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

Lecture                      Group discussion  
Written work                Note Taking  
Graphic organizers        Charting  
Summarizing                Specific Reading

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Plant Responses**

**Time Allotment: 4 Days**

**Unit Sequence: 34**

**Major Concepts to be learned:**

1. Plant Hormones
2. Plant Movements/Sees all Responses
3. Plant Movements/Sees all Responses

**Expected Skills to be demonstrated:**

1. List the five major types of plant hormones, and gives some effects of each
2. Give examples of the adaptive advantages of hormonal responses
3. Describe three agricultural or gardening applications for each three classes of plant hormones
4. Explain the difference between tropisms and nastic movements
5. List the environmental stimuli to which plants respond and tropisms for each stimulus
6. Explain the current hypothesis regarding oxidants and their function in the phototropism and gravitropism
7. Describe common nastic movements and explain how they help a plant survive
8. Describe what causes the us spectacular fall leaf colors
9. What is the role of phytochromes in plant responses

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A  
3.1.B  
3.1.C  
3.3.B

- 3.1.B.A2-5,9
- 3.1.B.B1,2,6
- 3.1.B.C1,3,4
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

Lecture	Group discussion
Research	Written work
Hands-on activity	Note Taking
Graphic organizers	Charting
Summarizing	Outlining
Specific Reading	

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Time Allotment: 4 Days**

**Major Concepts to be learned:**

1. The Nature of Animals
2. Animal Bodies
3. Comparison of Vertebrates and Invertebrates
4. Fertilization and Development

**Topic/Concept: Introduction to Animals**

**Unit Sequence: 35**

**Expected Skills to be demonstrated:**

1. Define the term in vertebrate and invertebrate
2. Identify four important characteristics of animals
3. List two kinds of tissues found only in animals
4. Explain how the first animals might have evolved from unicellular organisms
5. Define the term dorsal ventral anterior and posterior
6. Describe two types of symmetry found in animals & Name the traits that are strongly associated with bilateral symmetry
7. List two functions of the body cavity of animals & List three structural features that taxonomists used to classify animals
8. List four features found only in chordates & Compare the body plans and development of invertebrates and vertebrates
9. Define the term segmentation and name the phylum of segmented animals
10. Explain the differences between open circulatory systems and a closed circulatory system
11. Describe the digestive system found in most invertebrate phyla and compare it with the vertebrate digestive systems
12. List the steps of fertilization development through gastrulation
13. Identify the three primary germ layers and list two body parts formed from each germ layer
14. Define protostome and dueterostome
15. Contrast vinyl cleavage with radial cleavage and name the category of organisms undergo each type of cleavage
16. Contrast schizocoely with enterocoely

**PA Standards/Anchors:**

**Eligible Content:**

3.1.A	3.1.C	• 3.1.B.A1-9	3.1.B.C1-4
3.1.B	3.3.B	• 3.1.B.B1-6	3.3.B.B3

**Instructional Strategies:**

**Assessments:**

Cooperative groups	Lecture	Specific Reading	• Homework	Review
Group discussion	Written work	Summarizing	• Worksheets	Exam
Hands-on activity	Note Taking	Charting	• Quiz	
Graphic organizers				

**Course Title:** General Biology

**Topic/Concept:** Porifera, Cnidarians, and Ctenophores

**Time Allotment:** 4 Days

**Unit Sequence:** 36

**Major Concepts to be learned:**

1. Porifera
2. Cnidarians
3. Ctenophores

**Expected Skills to be demonstrated:**

1. Define in vertebrates, and explain why they are such a diverse group
2. Describe the basic body plan of the sponge
3. Describe the process of overfeeding in sponges
4. Contrast the process of sexual and asexual reproduction in sponges
5. Name and describe the two body forms of the cnidarians
6. Describe the common characteristics of cnidarians
7. Identify the three classes of cnidarians, and give an example of each
8. Describe the common characteristics of the ctenophores

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.1. C
- 3.3. A
- 3.3. B

- 3.1.B.A1, 4, 5, 8, 9
- 3.1.B.C1-4
- 3.3.B.A8
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

- |                    |                  |
|--------------------|------------------|
| Lecture            | Group discussion |
| Written work       | Note Taking      |
| Graphic organizers | Charting         |
| Summarizing        | Evaluating       |
| Specific Reading   |                  |

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title:** General Biology

**Topic/Concept:** Flatworms, Roundworms, and Rotifers

**Time Allotment:** 4 Days

**Unit Sequence:** 37

**Major Concepts to be learned:**

1. Platyhemnthes
2. Nematoda
3. Rotifera

**Expected Skills to be demonstrated:**

1. State the distinguishing characteristics of flatworms
2. Describe the anatomy of a planarian
3. Compare and contrast free-living and parasitic flatworms
4. Diagram the lifecycle of a fluke
5. Describe a life cycle of the tape worm
6. Describe the body plan of pseudocoelomate
7. Explain the relationship between humans and the three types of parasitic roundworms
8. Describe the anatomy of a rotifer

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.1. C
- 3.3. A
- 3.3. B

- 3.1.B.A1, 4, 5, 8, 9
- 3.1.B.C1-4
- 3.3.B.A8
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

- |                    |                  |
|--------------------|------------------|
| Lecture            | Group discussion |
| Written work       | Note Taking      |
| Graphic organizers | Charting         |
| Summarizing        | Specific Reading |

- Homework
- Worksheets
- Review
- Quiz
- Exam

**Course Title: General Biology**

**Topic/Concept: Mollusks and Annelids**

**Time Allotment: 4 Days**

**Unit Sequence: 38**

**Major Concepts to be learned:**

1. Mollusca
2. Annelida
3. Leaches

**Expected Skills to be demonstrated:**

1. Summarize the adaptive advantages of a true coelom.
2. Identify two feature shared by mollusks and annelids
3. Describe the structure and function of the radula
4. Name the characteristics of the four major classes of mollusks
5. List the advantages of body segmentation.
6. Explain how earthworms move.
7. Describe the organ system of earthworms
8. Distinguish between the three classes of annelids

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.1. C
- 3.3. A
- 3.3. B

- 3.1.B.A1, 4, 5, 8, 9
- 3.1.B.C1-4
- 3.3.B.A8
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

- Lecture
- Written work
- Graphic organizers
- Summarizing
- Specific Reading
- Group discussion
- Note Taking
- Charting
- Evaluating

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Phylum Arthropoda, Subphylum Crustacea, Subphyla Chelicerata and Uniramia**

**Time Allotment: 4 Days**

**Unit Sequence: 39**

**Major Concepts to be learned:**

1. Phylum Arthropoda
2. Subphylum Crustacea
3. Subphyla Chelicerata and Uniramia

**Expected Skills to be demonstrated:**

1. Describe the distinguishing characteristics of arthropods
2. Relate the structure of the arthropod exoskeleton to its function
3. Explain the process of molting in an arthropod
4. Name the four subphyla of the phylum Arthropoda, and describe the characteristics of each subphylum
5. Describe the characteristics of crustaceans
6. Give examples of crustaceans that are adapted to marine, fresh water, and land environments
7. Explain the functions of the appendages on a crayfish
8. Summarize digestion, respiration, circulation, and excretion in the crayfish
9. List the characteristics of the class Arachnida
10. Explain the adaptations spiders have for predatory life on land
11. List the distinguishing characteristics of scorpions and of mites and ticks
12. Describe similarities and differences between millipedes and centipedes

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.1. C
- 3.3. A
- 3.3. B

- 3.1.B.A1, 4, 5, 8, 9
- 3.1.B.C1-4
- 3.3.B.A8
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

- Cooperative groups
- Group discussion
- Written work
- Graphic organizers
- Summarizing
- Specific Reading
- Lecture
- Research
- Note Taking
- Charting

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Insects**

**Time Allotment: 4 Days**

**Unit Sequence: 40**

**Major Concepts to be learned:**

1. The insect world
2. Insect behavior
3. Success of insects

**Expected Skills to be demonstrated:**

1. State the major characteristics of the class Insecta
2. Explain why insects are so successfulList both harmful and beneficial effects of insects on human society
3. Describe the external structure and organ systems of a grasshopper
4. Explain incomplete and complete metamorphosis in insects
5. Name three ways insects communicate, and give an example of each
6. Describe the social organization of honeybees
7. Explain how honeybees communicate information about the location of food

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.1. C
- 3.3. A
- 3.3. B

- 3.1.B.A1, 4, 5, 8, 9
- 3.1.B.C1-4
- 3.3.B.A8
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

- Cooperative groups
- Group discussion
- Note Taking
- Charting
- Specific Reading
- Lecture
- Written work
- Graphic organizers
- Summarizing

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Echinoderms and Invertebrate Chordates**

**Time Allotment: 4 Days**

**Unit Sequence: 41**

**Major Concepts to be learned:**

1. Echinoderms
2. Chordates
3. Chordate Characteristics

**Expected Skills to be demonstrated:**

1. Discuss the evolutionary origin of echinoderms
2. List the characteristics that distinguish echinoderms from other phyla
3. Name representative species in each echinoderms class
4. Explain how the water-vascular system 80 movement and feeding
5. Describe sexual and asexual reproduction in the sea star
6. List the major characteristics of chordates
7. Describe the structure of lancelets
8. Describe the structure of tunicates

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.1. C
- 3.3. A
- 3.3. B

- 3.1.B.A1, 4, 5, 8, 9
- 3.1.B.C1-4
- 3.3.B.A8
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

- |                    |                  |
|--------------------|------------------|
| Cooperative groups | Lecture          |
| Group discussion   | Written work     |
| Hands-on activity  | Note Taking      |
| Graphic organizers | Charting         |
| Summarizing        | Specific Reading |

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Fish**

**Time Allotment: 4 Days**

**Unit Sequence: 42**

**Major Concepts to be learned:**

1. Introduction to vertebrates
2. Jawless fish
3. Sharks, and raysBony fish

**Expected Skills to be demonstrated:**

1. Identify the distinguishing characteristics of vertebrates
2. List the seven major groups of vertebrates, and give an example of each
3. Describe the characteristics of the early vertebrates
4. Explain the importance of jaws and paired fins in fish
5. Identify three problems faced by all fish
6. Describe the feeding behavior of lamprey and hagfish
7. Identify key characteristics of cartilaginous fish
8. Describe how sharks detect

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.1. C
- 3.3. A
- 3.3. B

- 3.1.B.A1, 4, 5, 8, 9
- 3.1.B.C1-4
- 3.3.B.A8
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

- |                    |                            |
|--------------------|----------------------------|
| Cooperative groups | Problem solving activities |
| Lecture            | Group discussion           |
| Written work       | Note Taking                |
| Graphic organizers | Charting                   |
| Summarizing        | Specific Reading           |

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Amphibians**

**Time Allotment: 4 Days**

**Unit Sequence: 43**

**Major Concepts to be learned:**

1. Origin and evolution of amphibians
2. Characteristics of amphibians
3. Reproduction in amphibians

**Expected Skills to be demonstrated:**

1. Describe two similarities between amphibians and lobe-finned fish
2. List three characteristics of Ichthyostega
3. List the major characteristics of living amphibians and Name the three orders of living amphibians, and give examples of each
4. Relate the structure of amphibians skin to the types of habitats in which amphibians can survive
5. Identify three adaptations for life on land shown by the scale of the frog
6. Describe the pattern of blood flow through and amphibian's heart
7. Describe how I frog fills its lungs with air
8. Explain the function of each organ of and amphibian's digestive system
9. Compare the amphibian's nervous system to that of a bony fish
10. Describe the lifecycle of a frog
11. Describe the changes that occur during metamorphosis in frogs
12. Identify two examples of parental care in amphibians

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.1. C
- 3.3. A
- 3.3. B

- 3.1.B.A1, 4, 5, 8, 9
- 3.1.B.C1-4
- 3.3.B.A8
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

- |                            |                    |
|----------------------------|--------------------|
| Problem solving activities | Lecture            |
| Group discussion           | Written work       |
| Note Taking                | Graphic organizers |
| Charting                   | Summarizing        |
| Evaluating                 | Specific Reading   |

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Reptiles**

**Time Allotment: 4 Days**

**Unit Sequence: 44**

**Major Concepts to be learned:**

1. Origin and Evolution of Reptiles
2. Characteristics of reptiles
3. Modern reptiles

**Expected Skills to be demonstrated:**

1. Identify and describe three groups of reptiles that lived during the Mesozoic era
2. Describe the asteroid-impact hypothesis to explain the extinction of the dinosaurs
3. Describe the structure of the amniotic egg, and explain the functions of its parts
4. Contrast the skin of reptiles with that of amphibians
5. Describe the pattern of blood flow through the heart of the lizard
6. Compare the lungs of reptiles with those of amphibians
7. Identify three senses of reptiles
8. Contrast endothermy with ectothermy
9. Explain the differences between oviparity, ovoviviparity, viviparity
10. Compare the anatomy of turtles with that of other reptiles
11. Describe how crocodiles capture prey Explain two antipredator defenses of lizards
12. Describe two ways makes subdue their prey Identify to characteristics tuataras

**PA Standards/Anchors:**

**Eligible Content:**

- 3.1. A
- 3.1. C
- 3.3. A
- 3.3. B

- 3.1.B.A1, 4, 5, 8, 9
- 3.1.B.C1-4
- 3.3.B.A8
- 3.3.B.B3

**Instructional Strategies:**

**Assessments:**

- Cooperative groups
- Group discussion
- Written work
- Graphic organizers
- Summarizing
- Specific Reading
- Lecture
- Research
- Note Taking
- Charting
- Evaluating

- Homework
- Worksheets
- Quiz
- Review
- Exam

**Course Title: General Biology**

**Topic/Concept: Birds**

**Time Allotment: 4 Days**

**Unit Sequence: 45**

**Major Concepts to be learned:**

1. Origin and Evolution of Birds
2. Characteristics of birds
3. Classification

**Expected Skills to be demonstrated:**

1. Identify and describe seven characteristics of birds
2. List three similarities between birds and dinosaurs
3. Describe the characteristics of Archaeopteryx
4. Summarize the two main hypotheses for the evolution of flight
5. Describe the structure of a contour feather
6. Identify two modifications for flight seen in a bird's skeletal system
7. Contrast the function of the gizzard with that of the crop
8. Trace the movement of air through the respiratory system of a bird
9. Explain the differences between altricial and precocial young
10. Describe the relationship between beak shape and diet in birds
11. List 12 orders of living birds, and name an example of each quarter
12. Describe the function of the syrinx

**PA Standards/Anchors:**

**Eligible Content:**

3.1. A 3.1. C 3.3. A 3.3. B	<ul style="list-style-type: none"><li>• 3.1.B.A1, 4, 5, 8, 9</li><li>• 3.1.B.C1-4</li><li>• 3.3.B.A8</li><li>• 3.3.B.B3</li></ul>
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**Instructional Strategies:**

**Assessments:**

Cooperative groups Group discussion Written work Graphic organizers Summarizing	Lecture Performance task Note Taking Charting Specific Reading	<ul style="list-style-type: none"><li>• Homework</li><li>• Worksheets</li><li>• Quiz</li><li>• Review</li><li>• Exam</li></ul>
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