

Level 3 Biology Curriculum

Timeline			
Week	Marking Period 1	Week	Marking Period 3
1	Intro to Biology	21	The Human Body
2	Intro to Biology	22	The Human Body
3	Intro to Biology	23	The Human Body
4	Intro to Biology	24	The Human Body
5	The Cell	25	The Human Body
6	The Cell	26	Biological Diversity
7	The Cell	27	Biological Diversity
8	The Cell	28	Biological Diversity
9	The Cell	29	Biological Diversity
10	The Cell	30	Bacteria, Viruses, Protists, & Fungi
Week	Marking Period 2	Week	Marking Period 4
11	The Cell	31	Bacteria, Viruses, Protists, & Fungi
12	Genetics	32	Bacteria, Viruses, Protists, & Fungi
13	Genetics	33	Plants
14	Genetics	34	Plants
15	Genetics	35	Animals
16	Genetics	36	Animals
17	Winter Holiday	37	Biomes & Ecosystems
18	Genetics	38	Biomes & Ecosystems
19	Genetics	39	Biomes & Ecosystems
20	Midterm Exams	40	Final Exams

Time Frame	4 Weeks
Topic	
Intro to Biology	
Essential Questions	
<ul style="list-style-type: none"> • What is biology? • What are the characteristics of science? • What is the scientific method? • What is the importance of laboratory safety? • What is the proper care and procedures for use of a microscope? 	
Enduring Understandings	
<ul style="list-style-type: none"> • Nature of biology. • Scientific method • Scientific –Tools/Technology • Lab safety • Use of a microscope. 	
Alignment to NJCCCS	
<ul style="list-style-type: none"> • 5.1.12.A.1-3 • 5.1.12.B.1-4 • 5.1.12.C.1-3 • 5.1.12.D.1-3 	
Key Concepts and Skills	
<ul style="list-style-type: none"> • Distinguish between characteristics life. • Interpret scientific investigations using scientific methods. • Relate science to current events • Demonstrate proper and safe lab techniques. • Demonstrate proper use and care of a compound microscope 	
Learning Activities	
<ul style="list-style-type: none"> • Scientific Method – dish Soap Comparison • Microscope – care and use • Tennis Ball – Measurements • Poster – Careers in Biology 	
Assessments	
<ul style="list-style-type: none"> • Topic worksheets • Section Quizzes and Tests • Observation Assessment/Lab Activities 	

- Writing Tasks/Lab Reports
- Projects/Performing Assessment

21st Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
X	Life and Career Skills	X	Information Literacy	X	Media Literacy		

Interdisciplinary Connections

- Math:
- Social Studies: All Lecture/Discussions Require the Historical Development of the Specific Topic Being Studied.
- Language Arts: There is a writing component to each unit in the form of lab reports. Additionally, each test includes an essay section.
- Fine Arts:

Technology Integration

- PowerPoint Presentations
- Data Projector
- Elmo Incorporation
- DVD/VHS/Disc Demonstration
- YouTube Content Shorts
- Each Class Has 12 Student Computers and the Use of Lap Top Computer Carts
- Microsoft Office Suite 2010
- Integration of Cell Phone Usage by Students to Access Internet During Lecture/Discussions
- All Laboratory Equipment is Technology

Time Frame	8 Weeks
Topic	
The Cell	
Essential Questions	
<ul style="list-style-type: none"> • What are the particles that make up an Atom? • What is the role of enzymes in chemical reactions? • What is the difference between acids and bases? • What are the 4 types of macromolecules? • What are the differences between prokaryotes and eukaryotes? • What is the structure and function of the different cell organelles? • What are the differences between plant and animal cells? • What are the ways materials move in and out of a cell? • How do autotrophs and heterotrophs differ? • How do the chloroplasts convert light energy into chemical energy? • How do the mitochondria convert sugar into ATP? • What are the stages of the cell cycle? 	
Enduring Understandings	
<ul style="list-style-type: none"> • Atoms <ul style="list-style-type: none"> ✓ Structure and Function • Enzymes <ul style="list-style-type: none"> ✓ Structure and Function • Macromolecules <ul style="list-style-type: none"> ✓ Structure and Function • Cells <ul style="list-style-type: none"> ✓ Energy Transfer ✓ Structure and Function ✓ Molecular Transport ✓ Reproduction 	
Alignment to NJCCCS	
<ul style="list-style-type: none"> • 5.1.12.A.1-3 • 5.1.12.B.1-4 • 5.1.12.C.1-3 • 5.1.12.D.1-3 	<ul style="list-style-type: none"> • 5.3.12.A.1-6
Key Concepts and Skills	
<ul style="list-style-type: none"> • Diagram atoms. • Balance reactions equations with enzymes. • Collect data on effects of acids and bases. 	

- Distinguish between the 4 macromolecules.
- Differentiate between energy transfer processes in cells.
- Differentiate between the transport processes that move materials through cells.
- Distinguish the different stages of the cell cycle and mitosis.

Learning Activities

- Enzyme – Liver Lab
- Identifying Organic Compounds
- Effects of Acids and Bases – buffer
- Acid vs. Base – pH testing
- Food analysis
- Observing animal and plant cells- staining
- Diffusion and Osmosis – potato core lab
- Diffusion and cell Size – agar block lab
- Photosynthesis/Cellular Respiration elodea plants
- Mitosis and Cytokinesis – the onion root tip lab
- Cell Organelle – structure and function

Assessments

- Topic worksheets
- Section Quizzes and Tests
- Observation Assessment/Lab Activities
- Writing Tasks/Lab Reports
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Time Frame	8 Weeks
Topic	
Genetics	
Essential Questions	
<ul style="list-style-type: none"> • Why is the chromosome number reduced in meiosis? • How is meiosis importance to providing genetic variation? • Why are Mendel’s Laws important to the study of genetics? • How dominance/recessive patterns be determined? • How can sex linked genetic patterns be determined? • How normal and abnormal karyotypes be distinguished? • How was DNA determined to be the genetic carrier? • How is DNA replicated? • How is the code of DNA transcribed and translated in to protein? • What is the role of mutations? • How can genotypes and phenotypes be predicted using punnett squares? • What is the Human genome project and the role of forensic science? 	
Enduring Understandings	
<ul style="list-style-type: none"> • Compare mitosis and meiosis. • Diagram and identify the stages of meiosis. Explain the significance of crossing over to genetic variation. • Mendelian and Non-Mendelian Inheritance. • Reading and making karyotypes • Historical perspective of DNA • Structure and Function of DNA • Protein Synthesis • Genetic crosses • DNA – tools and technology 	
Alignment to NJCCCS	
<ul style="list-style-type: none"> • 5.1.12.A.1-3 • 5.1.12.B.1-4 • 5.1.12.C.1-3 • 5.1.12.D.1-3 	<ul style="list-style-type: none"> • 5.3.12.D.1-3
Key Concepts and Skills	
<ul style="list-style-type: none"> • Summarize Mendel’s Laws of genetics. • Compare and contrast mitosis and meiosis. • Follow Mendelian and Non-Mendelian genetic patterns using punnett squares. • Read karyotypes. 	

- Summarize the process of DNA replication
- Determine the relationships between mutations and genetic disorders.
- Summarize the process of protein synthesis.
- Compare and contrast DNA and RNA

Learning Activities

- Karyotyping
- Probability and genetics
- The Face Lab
- Protein synthesis decoding sentences of RNA
- Posters – genetic disorders

Assessments

- Topic worksheets
- Section Quizzes and Tests
- Observation Assessment/Lab Activities
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Time Frame	8 Weeks	
Topic		
The Human Body		
Essential Questions		
<ul style="list-style-type: none"> • What are the major structures and functions of the integumentary, skeletal and muscular systems? • What are the major parts of a neuron and how do they function in the nervous system? • What is the flow of blood through the body and heart? • What is the path of air through the respiratory system? • What is the function of the kidney? • What are the main functions of the digestive system? • How does the number of calories eaten relate to the need of the body? • What are the functions of the glands that make up the endocrine system? • What are the structure and function of the parts of the male and female reproductive system? • What are the stages of development for an embryo? • How does the immune system work to protect against various pathogens? 		
Enduring Understandings		
<p>Discuss and demonstrate the functioning of each of the following systems:</p> <ul style="list-style-type: none"> • Integumentary • Skeletal • Muscular • Nervous • Circulatory • Respiratory • Excretory • Digestive • Endocrine • Reproduction / development • Immune 		
Alignment to NJCCCS		
<ul style="list-style-type: none"> • 5.1.12.A.1-3 • 5.1.12.B.1-4 • 5.1.12.C.1-3 • 5.1.12.D.1-3 	<ul style="list-style-type: none"> • 5.3.12.A.1-6 	
Key Concepts and Skills		
<p>Describe the structure and function of the following systems:</p> <ul style="list-style-type: none"> • Integumentary • Skeletal 		

- Muscular
- Nervous
- Circulatory
- Respiratory
- Excretory
- Digestive
- Endocrine
- Reproduction / development
- Immune

Learning Activities

- The Making of Zoe: A story that includes all parts of development.
- Embryology
- Reproduction : Human Menstrual cycle
- Skeletal/muscular systems: Identify bones and skeletal muscles activity
- Nervous System: Skin sensitivity and brain model
- Endocrine System: A sweet system
- Digestive system: Digestive poster
- Digestive system: vitamin and mineral research

Assessments

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Time Frame	4 Weeks
Topic	
Biological Diversity	
Essential Questions	
<ul style="list-style-type: none"> • What are the steps to fossilization? • What is the endosymbiont theory? • What is the evidence for organisms changing over time that convinced Darwin of evolution. • What is the physiological and biochemistry evidence exists to support natural selection? • What are the patterns observed in evolution? • What are the characteristics of primates? • What is the pattern of evolution seen in the evolution of the genus Homo? • How does the classification system made by Linnaeus' work to classify all living organisms. • What is the concept of specie? • How do the 3 domains and 6 kingdoms categorize living organisms? 	
Enduring Understandings	
<ul style="list-style-type: none"> • Fossilization • Biochemical Evolution • The Theory of Evolution by Natural Selection by Charles Darwin • Classification <ul style="list-style-type: none"> ✓ Historical perspective ✓ Domains and Kingdoms of Live ✓ Dichotomous Keys 	
Alignment to NJCCCS	
<ul style="list-style-type: none"> • 5.1.12.A.1-3 • 5.1.12.B.1-4 • 5.1.12.C.1-3 • 5.1.12.D.1-3 	<ul style="list-style-type: none"> • 5.3.12.E.1-4
Key Concepts and Skills	
<ul style="list-style-type: none"> • Describe how fossils are produces and how they support the evidence for evolution • Interpret scientific evidence used to support the theory of evolution • Relate how modern organisms can be used to determine evolutionary relationships. • Demonstrate an understanding of the system of scientific classification. • Describe and differentiate between the domains and kingdoms of living things. 	
Learning Activities	
<ul style="list-style-type: none"> • Natural Selection – pepper moth lab • Primate Evolution Lab • Taxonomy – Classification Lab 	

- Dichotomous Key to Sharks

Assessments

- Topic worksheets
- Section Quizzes and Tests
- Observation Assessment/Lab Activities
- Writing Tasks/Lab Reports
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21st Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
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Time Frame	4 Weeks	
Topic		
Bacteria, Viruses, Protists, and Fungi		
Essential Questions		
<ul style="list-style-type: none"> • What are the different types of bacteria and their impact on humans? • What is the structure and function of a virus and its role in disease? • How are protists classified? • What are the major characteristics of fungi? • What are the beneficial and deleterious impacts of bacteria, viruses, protists and fungi on humans? 		
Enduring Understandings		
<ul style="list-style-type: none"> • Classification • Structure and function • Reproduction – life cycles • Impact on Humans 		
Alignment to NJCCCS		
<ul style="list-style-type: none"> • 5.1.12.A.1-3 • 5.1.12.B.1-4 • 5.1.12.C.1-3 • 5.1.12.D.1-3 	<ul style="list-style-type: none"> • 5.3.12.A.1-6 • 5.3.12.B.1-6 • 5.3.12.C.1-2 • 5.3.12.D.1-3 • 5.3.12.E.1-4 	
Key Concepts and Skills		
<ul style="list-style-type: none"> • Identify and describe the events of bacteria reproduction. • Identify the stages of viral replication • Relate the structure of bacterial cells to their function • Describe the beneficial effects of microorganisms to humans and the ecosystem. • Relate the effects of pathogenic disease to individuals and society. • Compare and contrast the various divisions of protists and fungi. 		
Learning Activities		
<ul style="list-style-type: none"> • Fungus internet lab • Fungi Slides • Protist – pond water / slides • Viruses: Infection Mystery/ Killer Virus • Pathogens: Research Project 		
Assessments		
<ul style="list-style-type: none"> • Topic worksheets 		

- Section Quizzes and Tests
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Time Frame	2 Weeks	
Topic		
Plants		
Essential Questions		
<ul style="list-style-type: none"> • What are the adaptations plants made to live on land? • What is the importance of vascular tissue? • What is the alternation of generation in the plant life cycle? • What are the characteristics of seedless and seeded plants? • What are the functions of the major structures of plants? • What are the effects of plant hormones on plant growth? • What are the parts of a flower and how do they relate to reproduction of a plant? 		
Enduring Understandings		
<ul style="list-style-type: none"> • Structure and function • Classification • Reproduction and Development 		
Alignment to NJCCCS		
<ul style="list-style-type: none"> • 5.1.12.A.1-3 • 5.1.12.B.1-4 • 5.1.12.C.1-3 • 5.1.12.D.1-3 	<ul style="list-style-type: none"> • 5.3.12.A.1-6 • 5.3.12.B.1-6 • 5.3.12.C.1-2 • 5.3.12.E.1-4 	
Key Concepts and Skills		
<ul style="list-style-type: none"> • Assess the importance of vascular tissue to plant life on land. • Identify the structures of plants and relate them to their function (roots, stems, leaves and flowers). • Identify the parts of the life cycle of moss and relate it the concept of alternation of generation. • Describe and analyze the different types of plant responses. 		
Learning Activities		
<ul style="list-style-type: none"> • Moss Lab – alternation of generation • Leaf Classification – computer lab • Plant structure - flower dissection 		
Assessments		
<ul style="list-style-type: none"> • Topic worksheets • Section Quizzes and Tests • Observation Assessment/Lab Activities 		

- Writing Tasks/Lab Reports
- Projects/Performing Assessment

21st Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
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Interdisciplinary Connections

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Time Frame	2 Weeks						
Topic							
Animals							
Essential Questions							
<ul style="list-style-type: none"> • What allows animals to live in different habitats? • What are the stages of animal embryonic development? • What are the major structures that differentiate the various groups of invertebrates and vertebrates. (Sponges – Worms – Arthropods – Fishes - Amphibians – Reptiles – Birds – Mammals) 							
Enduring Understandings							
<ul style="list-style-type: none"> • Structure and function • Classification • Reproduction and Development 							
Alignment to NJCCCS							
<ul style="list-style-type: none"> • 5.1.12.A.1-3 • 5.1.12.B.1-4 • 5.1.12.C.1-3 • 5.1.12.D.1-3 				<ul style="list-style-type: none"> • 5.3.12.A.1-6 • 5.3.12.B.1-6 • 5.3.12.C.1-2 • 5.3.12.E.1-4 			
Key Concepts and Skills							
<ul style="list-style-type: none"> • Compare and contrast animal structure and function. • Distinguish stages of embryonic development. 							
Learning Activities							
<ul style="list-style-type: none"> • Owl Pellet:Skeletal Analysis • Invertebrates: Creatures of the Deep 							
Assessments							
<ul style="list-style-type: none"> • Topic worksheets • Section Quizzes and Tests • Observation Assessment/Lab Activities • Writing Tasks/Lab Reports • Projects/Performing Assessment 							
21st Century Skills							
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Interdisciplinary Connections							
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Time Frame	3 Weeks	
Topic		
Biomes and Ecosystems		
Essential Questions		
<ul style="list-style-type: none"> • What are the differences between abiotic and biotic factors? • How does energy flow through an ecosystem? • How is matter cycled through an ecosystem? • What is the relationship between producers, consumers, and decomposers and how do they fit into food chains and food webs? • What are the different biomes that exist on earth? • What are the different types of population curves? • What is the current trend in human population growth? • What is the importance of biodiversity and what threatens it? 		
Enduring Understandings		
<ul style="list-style-type: none"> • Laws of Bioenergetics • Water Cycle, Carbon Cycle • Food Chains / Webs • Climatograms: Interaction of Abiotic and Biotic • Population Growth • Conservation Attempts to Preserve Biodiversity 		
Alignment to NJCCCS		
<ul style="list-style-type: none"> • 5.1.12.A.1-3 • 5.1.12.B.1-4 • 5.1.12.C.1-3 • 5.1.12.D.1-3 	<ul style="list-style-type: none"> • 5.4.12.E.1-2 • 5.4.12.F.1-3 • 5.4.12.G.1-7 	
Key Concepts and Skills		
<ul style="list-style-type: none"> • Describe the flow of energy and the cycle of matter through an ecosystem. • To construct food chains and food webs to see the inter-relationship that exists between all living organisms. • Distinguish between various biomes and relate to abiotic factors. • To be able to graph and analyze different population curves. 		
Learning Activities		
<ul style="list-style-type: none"> • Climatograms: Interpreting Biomes • Biomes: Travel Brochure • Turkey Trouble – computer graphing • NJ/FI food webs • Human vs. Deer Population 		

- Owl Pellet – Food chain / web

Assessments

- Topic worksheets
- Section Quizzes and Tests
- Observation Assessment/Lab Activities
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