

Wallenpaupack Area School District

COURSE: Applied Biology

GRADE LEVEL: 10th Grade

LENGTH OF COURSE: 90 days/year

TEXT: Biology: An Everyday Experience

PUBLISHER: Glencoe McGraw-Hill

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COURSE DESCRIPTION:

The topics taught are scientific process, genetics, ecology and nutrition. This is a hands-on biology course that is task oriented and will appeal to a wide variety of learning styles.

CURRICULUM WRITING TEAM:

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DATE OF REVISION:

2004

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Course: Applied Biology

Grade Level: Grade 10

Unit: Scientific Process

PA Standards: 3.2.10.A
3.2.10.B
3.2.10.B

Topics:	Skills:
Inquiry and Design	<p>Apply knowledge and understanding about the nature of scientific and technological knowledge</p> <ul style="list-style-type: none">• Compare and contrast scientific theories and beliefs• Know that science uses both direct and indirect observation means to study the world and the universe• Integrate new information into existing theories and explain implied results <p>Apply process knowledge and organize scientific and technological phenomena in varied ways</p> <ul style="list-style-type: none">• Describe materials using precise quantitative and qualitative skills based on observations• Develop appropriate scientific experiments: raising questions, formulating hypotheses, testing, controlled experiments, recognizing variables, manipulating variables, interpreting data, and producing solutions <p>Apply the elements of scientific inquiry to solve problems</p> <ul style="list-style-type: none">• Generate questions about objects, organisms and/or events that can be answered through scientific investigations• Evaluate the appropriateness of questions• Design an investigation with adequate control and limited variables to investigate a question• Conduct a multiple step experiment• Organize experimental information using a variety of analytic methods• Judge the significance of experimental information in answering the question• Suggest additional steps that might be done experimentally

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Activities:	Performance Assessments:
Concept map of subdivisions of science and biology Diving rod activity Laserdisc slides and movies Microscope lab Seed lab	Assignment evaluations Teacher observations Student performances on investigations and labs Notebook evaluations Exams

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Course: Applied Biology

Grade Level: Grade 10

Unit: Life Processes

PA Standards: 3.1.10.A
3.1.10.B
3.1.10.C
3.1.10.E
3.3.10.A
3.3.10.B
3.3.10.C

Topics:	Skills:
Unifying themes	<p>Discriminate among the concepts of systems, subsystems, feedback and control in solving technological problems</p> <ul style="list-style-type: none">• Identify the function of subsystems within a larger system <p>Describe concepts of models as a way to predict and understand science and technology</p> <ul style="list-style-type: none">• Distinguish between different types of models and modeling techniques and apply their appropriate use in specific <p>Apply patterns as repeated processes or recurring elements in science and technology</p> <ul style="list-style-type: none">• Examine and describe recurring patterns that form the basis of biological classification, chemical periodicity, geological order and astronomical order <p>Describe patterns of change in nature, physical and man made systems</p> <ul style="list-style-type: none">• Describe how fundamental science and technology concepts are used to solve practical <p>Recognize that stable systems often involve underlying dynamic</p> <ul style="list-style-type: none">• Describe the effects of error in measurements <p>Explain the structural and functional similarities and differences found among living things</p> <ul style="list-style-type: none">• Explain the relationship between structure and function at the molecular and cellular levels <p>Describe and explain the chemical and structural basis of living organisms</p>

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	SKILLS: (continued)
	<ul style="list-style-type: none"> • Describe the relationship between the structure of organic molecules and the function they serve in living organisms • Identify the specialized structures and regions of the cell and the functions of each • Explain how cells store and use information to guide their functions • Explain cell functions and processes in terms of chemical reactions and energy changes <p>Describe how genetic information is inherited and expressed</p> <ul style="list-style-type: none"> • Compare and contrast the function of mitosis and meiosis • Describe mutations' effects on trait's expressions • Distinguish different reproductive patterns in living things (e.g., budding, spores, fission) • Explain the relationship among DNA, genes and chromosomes <p>Describe the role of DNA in protein synthesis as it relates to gene expression</p>
Activities:	Performance Assessments:
<p>Laser disc Videos Microscope use Cell coloring activity Is it alive? Demo Cell observation lab Diffusion-osmosis activities Homeostasis lab (Elodea) DNA and protein synthesis models Food label analysis lab DNA ladder activity Protein synthesis activity DNA fingerprinting activity Computer assisted instruction Textbook readings and questions</p>	<p>Assignment evaluations Teacher observations Student performances on investigations and labs Notebook evaluations Exams</p>

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Course: Applied Biology

Grade Level: Grade 10

Unit: Genetics and Biotechnology

PA Standards: 3.1.10.B
3.3.10.C
3.3.12.C

Topics:	Skills:
<p>Biological sciences Unifying themes</p>	<p>Describe how genetic information is inherited and expressed</p> <ul style="list-style-type: none"> • Describe mutations' effects on trait's expression • Distinguish different reproductive patterns in living things (e.g., budding, spores, fission) • Explain the relationship among DNA, genes and chromosomes • Explain different types of inheritance (e.g., multiple allele, sex-influenced traits) <p>Explain gene inheritance and expression at the molecular level</p> <ul style="list-style-type: none"> • Analyze gene expression at the molecular level • Describe the roles of nucleic acids in cellular reproduction and protein synthesis • Describe genetic engineering techniques, applications and impacts <p>Explain birth defects from the standpoint of embryological development and/or changes in genetic makeup</p> <p>Describe concepts of models as a way to predict and understand science and biology</p> <ul style="list-style-type: none"> • Examine the advantages of using models to demonstrate process and outcomes <p>Apply patterns as repeated processes or recurring elements in science and biology</p> <ul style="list-style-type: none"> • Examine and describe recurring patterns that form the basis of biological classification, chemical, periodicity, geological order and astronomical order

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Activities:	Performance Assessments:
Videos Human face variations activity Genetics problems Pedigree analysis Pedigree project Blood typing activity Genetic disorder research and poster Computer assisted instruction Textbook readings and questions	Assignment evaluations Teacher observations Student performances on investigations and labs Notebook evaluations Exams

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Course: Applied Biology

Grade Level: Grade 10

Unit: Embryology and Reproduction

PA Standards: 3.3.10.C
3.3.12.C

Topics: Biological sciences	Skills: Describe how genetic information is inherited and expressed <ul style="list-style-type: none">• Explain the relationship among, DNA, genes and chromosomes Explain gene inheritance and expression at the molecular level <ul style="list-style-type: none">• Explain birth defects from the standpoint of embryological development and/or changes in genetic makeup
Activities: Medaka fish observations First nine months pamphlet Laser disc Videos Textbook readings and questions	Performance Assessments: Assignment evaluations Teacher observations Student performances on investigations and labs Notebook evaluations Exams

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Course: Applied Biology

Grade Level: Grade 10

Unit: Evolution and Adaptations

PA Standards: 3.2.10.A
3.3.10.C
3.3.10.D

Topics:	Skills:
Inquiry and design Biological sciences	<p>Apply knowledge and understanding about the nature of specific and technological knowledge</p> <ul style="list-style-type: none">• Compare and contrast scientific theories and beliefs• Know that science uses both direct and indirect observation means to study the world and the universe• Integrate new information into existing theories and explain implied results <p>Describe how genetic information is inherited and expressed</p> <ul style="list-style-type: none">• Compare random and selective breeding practices and their results (e.g., antibiotic resistant bacteria) <p>Explain the mechanisms of the theory of evolution</p> <ul style="list-style-type: none">• Analyze data from fossil records, similarities in anatomy and physiology, embryological studies and DNA studies that are relevant to the theory of evolution• Explain the role of mutations and gene recombination in changing a population of organisms• Compare modern day descendants of extinct species and propose possible scientific accounts for their present appearance• Describe the facts (e.g., isolation, differential reproduction) affecting gene frequency in a population over time and their consequences• Describe and differentiate between the roles of natural selection and genetic drift• Explain why natural selection can act only on inherited traits• Apply the concept of natural selection to illustrate and account for a species' survival, extinction or change over time

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Activities:	Performance Assessments:
Videos Primate skull activity Natural selection activity Primate fossil mapping Adaptation activity Textbook readings and questions	Assignment evaluations Teacher observations Student performances on investigations and labs Notebook evaluations Exams

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Course: Applied Biology

Grade Level: Grade 10

Unit: Animals, Ecosystems, and Biomes

PA Standards: 3.1.10.C
3.3.10.A
4.6.10.A
4.7.10.A
4.7.10.B

Topics:	Skills:
<p>Unifying themes Biological sciences</p>	<p>Apply patterns as repeated processes or recurring elements in science and technology</p> <ul style="list-style-type: none"> • Examine and describe recurring patterns that form the basis of biological classification, chemical periodicity, geological order and astronomical order <p>Explain the structural and functional similarities and differences found among living things</p> <ul style="list-style-type: none"> • Identify and characterize major life forms according to their placement in existing classification groups • Describe organizing schemes of classification keys • Identify and characterize major life forms by kingdom, phyla, class and order <p>Explain the biotic abiotic components of an ecosystem and their interaction</p> <ul style="list-style-type: none"> • Identify the major biomes and explain their similarities and differences • Compare and contrast the interactions of biotic and abiotic components in an ecosystem • Analyze the effects of abiotic factors on specific ecosystems • Describe how the availability of resources affects organisms in an ecosystem • Explain energy flow in a food chain through an energy pyramid • Evaluate the efficiency of energy flow in a food chain • Explain the concept of carrying capacity in an ecosystem • Explain trophic levels • Identify a specific environmental impact and predict what change may take place to affect homeostasis • Examine and explain how organisms modify their environments to sustain their needs

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	<p>Skills: (continued)</p> <ul style="list-style-type: none"> • Assess the effects of latitude and altitude on biomes • Interpret possible causes of population fluctuations <p>Explain the significance of diversity in ecosystems</p> <ul style="list-style-type: none"> • Explain the role that specific organisms have in their ecosystem • Identify a species and explain what affects its increase or decline might have on the ecosystem • Identify a species and explain how its adaptations are related to its niche in the environment <p>Explain how structure, function and behavior of plants and animals affect their ability to survive</p> <ul style="list-style-type: none"> • Describe an organism's adaptations for survival in its habitat • Compare adaptations among species
<p>Activities:</p> <p>Videos Biome research and posters Biome activity Fish activity Textbook readings and questions</p>	<p>Performance Assessments:</p> <p>Assignment evaluations Teacher observations Student performances on investigations and labs Notebook evaluations Exams</p>

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Course: Applied Biology

Grade Level: Grade 10

Unit: Ecology

PA Standards: 3.7.10.B
 4.1.10.A
 4.1.10.B
 4.1.10.C
 4.1.10.D
 4.1.10.E
 4.3.10.B
 4.4.10.B

Topics:	Skills:
<p>Watersheds and Wetlands Environmental Health Agriculture and Society Technological Devices</p>	<p>Describe changes that occur from a stream's origin to its final outflow</p> <ul style="list-style-type: none"> • Identify Pennsylvania's major watersheds and their related river systems <p>Explain the relationship among landforms, vegetations and the amount and speed of water</p> <ul style="list-style-type: none"> • Analyze a stream's physical characteristics • Describe how topography influences streams • Explain the influence of mountains on precipitation • Explain how vegetation affects storm water runoff • Delineate the boundaries of a watershed • Describe factors that affect the quality of groundwater • Explain how the speed of water and vegetation cover relates to erosion <p>Describe the physical characteristics of a stream and determine the types of organisms found in aquatic environments</p> <ul style="list-style-type: none"> • Describe and explain the physical factors that affect a stream and the organisms living there • Identify terrestrial and aquatic organisms that live in a watershed • Identify the types of organisms that would live in a stream based on the stream's physical characteristics • Explain the habitat needs of specific aquatic organisms <p>Describe the multiple functions of wetlands</p> <ul style="list-style-type: none"> • Describe wetlands in terms of their effect (e.g., habitat, flood, buffer

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	<p>Skills: (continued)</p> <ul style="list-style-type: none"> • zones, prevention areas, nurseries, food production areas) • Explain how a wetland influences water quality, wildlife and water retention • Analyze wetlands through their indicators (e.g., soils, plants, hydrology) <p>Identify and describe natural and human events on watersheds and wetlands</p> <ul style="list-style-type: none"> • Describe how natural events affect a watershed (e.g., drought, floods) • Identify the effects of humans and human events on watersheds <p>Explain how multiple variables determine the effects of pollution on environmental health, natural processes and human practices</p> <ul style="list-style-type: none"> • Explain how human practices affect the quality of water and soil <p>Assess the influence of agricultural science on farming practices</p> <ul style="list-style-type: none"> • Analyze and explain the various practices on nutrient management on the farm <p>Apply appropriate instruments and apparatus to examine a variety of objects and processes</p> <p>Describe and use appropriate instruments to gather and analyze data</p>
<p>Activities:</p>	<p>Performance Assessments:</p>
<p>Lake Wallenpaupack: A Resource Worth Protecting Guest speakers – careers Activity manual\ Activity binder Computer graph analysis GPS and GIS activities Fish sampling activities</p>	<p>Assignment evaluations Teacher observations Student performances on investigations and labs Notebook evaluations Exams</p>

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Course: Applied Biology

Grade Level: Grade 10

Unit: Nutrition

PA Standards: 3.1.10.A

Topics: Unifying themes	Skills: Discriminate among the concepts of systems, subsystems, feedback and control in solving technological problems <ul style="list-style-type: none">Describe the interrelationships among inputs, processes, outputs, feedback and control in specific systems
Activities: Computer assisted instruction Diet research and brochure Textbook readings and questions	Performance Assessments: Assignment evaluations Teacher observations Student performances on investigations and labs Notebook evaluations Exams

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Course: Applied Biology

Grade Level: Grade 10

Unit: Disease and Wellness

PA Standards: 3.3.12.A
3.3.12.B

Topics:	Skills:
Biological sciences	<p>Explain the relationship between structure and function at all levels of organization</p> <ul style="list-style-type: none">• Explain and analyze the relationship between structure and function at the molecular, cellular and organ-system level <p>Analyze the chemical and structural basis of living organisms</p> <ul style="list-style-type: none">• Evaluate relationships between structure and functions of different anatomical parts given their structure
Activities:	Performance Assessments:
Videos Design a parasite activity Food preparation activity Disease research Epidemiology lab Computer assisted instruction Textbook readings and questions	Assignment evaluations Teacher observations Student performances on investigations and labs Notebook evaluations Exams