

GROTON PUBLIC SCHOOLS

Groton, Connecticut



SCIENCE CURRICULUM

Biology

10th grade

Revision Approved June 2011

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Groton Public Schools Pre-K–12 Science Curriculum Philosophy

Science education should awaken the natural sense of excitement and wonder in each child and facilitate a realization that science knowledge is power in our ever-changing world.

General Beliefs:

The purpose of the Groton Public Schools (GPS) science instructional program is to develop scientific literacy in all students. The scientifically literate person:

- Is aware that science, mathematics, and technology are interdependent human enterprises with strengths and limitations;
- Understands key concepts and principles of science;
- Is familiar with the natural world and recognizes both its diversity and unity; and
- Applies scientific knowledge and ways of thinking for individual and social purposes.

The teaching of science in GPS is coordinated for Grades K–12, aligned with both state and national content standards and performance outcomes. The curriculum reflects the belief that all students can learn science. The curriculum considers the multicultural backgrounds and various abilities, achievement levels, interests, and learning styles of students. Educational strategies, methods, technologies, and resources are to be varied in order to ensure and promote the independence of students as learners. Students, teachers, parents, and community members all share the responsibility for education in GPS.

Reasons for Learning Content:

Science education prepares students for a global society in which environmental, social, and economic issues are related to science, mathematics, and technology. Therefore, the curriculum emphasizes the process skills of an inquiry based science program designed on a continuum through all content standards.

Teaching Strategies:

Scientific literacy is best achieved by meeting the individual needs of students using an assortment of developmentally appropriate, student-centered activities. Instruction actively engages students in learning and encourages enjoyment of the scientific process, while developing an understanding of important concepts and skills. Teaching strategies and methods may include individualization, remediation, flexible grouping, collaborative learning, lateral expansion, and acceleration as deemed appropriate. Furthermore, inquiry based experiences, hands-on explorations, laboratory experiences, demonstrations, field experiences, student discourse, and the use of all forms of available technologies and community resources are considered components of the learning process.

Assessment:

Effective assessment is an ongoing process of monitoring student learning, guiding further instruction, and improving the program. It aligns with instructional strategies and curriculum content. A variety of formal and informal assessment options are implemented to provide opportunities for success for students with different learning styles and to provide broad information about student learning. Examples include journals, projects, teacher observation, models, self-evaluations, quizzes, laboratory reports, and various digital tools to demonstrate student understanding.

Technology:

The ability to utilize technology as a tool is an essential life skill. As it evolves, technology plays a role in providing up-to-date content and variety in instructional strategies and assessment techniques in order to prepare all students for their future in the world community.

21st Century Learning Experiences:

Common learning experiences include opportunities to demonstrate collaborative learning, critical thinking, problem solving, global citizenship, digital literacy, creativity and innovation.

The Connecticut Common Core of Learning

The Groton Public Schools Science Curriculum aligns with the Connecticut Common Core of Learning. The Common Core provides a set of high expectations for all K–12 students to develop to their fullest potential. It recognizes that students have different levels of readiness, interests, and aspirations. However, it sets no limits on anyone and provides all students the opportunity to achieve within one common core.

The Common Core provides students with the knowledge and intellectual tools to apply scientific skills, processes, and methods of inquiry to real world settings. It develops young people who are free to ask questions, seek information, and validate explanations in thoughtful and creative ways. The students will understand the relationship of science to other curriculum areas and transfer knowledge across subject areas.

The Common Core outlines skills, strategies, and competencies needed to meet the scientific demands of the 21st Century.

The Learning Environment

An inquiry based program requires a learning environment that promotes student engagement in hands-on and minds-on scientific activities. The support of the Groton Public Schools K–12 Science Curriculum through appropriate facilities and resources is essential:

Resources

- Teacher resources
- Equipment and supplies
- Present and emerging technologies
- Print resources
- Teacher training
- Consumables

Facilities

- Adequate wiring for emerging technologies
- Sufficient electrical outlets
- Sinks
- Safety equipment
- Ample laboratory work and storage space
- Furniture that accommodates instructional needs of a diverse population of students
- Meet OSHA related lab standards (see appendix)

Management

- Flexible grouping
- Cooperative learning teams
- Teacher as facilitator
- Supportive learning environment

Safety

- Appropriate equipment and teacher training
- OSHA lab standards

Adequate Funding

- To implement and maintain the program at the highest standard

As a result of this learning environment, the students will be equipped to:

- Work successfully using flexible grouping situations
- Experience inquiry based science that will develop the skills of synthesizing, Predicting, hypothesizing, and evaluating
- Become scientifically literate life-long learners

Program Goals

It is the goal of the Groton Public Schools Science Program that our graduates know the basic concepts of, and the interrelationships among, biology, chemistry, physics, and earth and space sciences, and will be able to apply scientific skills and processes to real-world settings.

To meet this goal, students will:

- Understand and apply basic concepts, principles and theories, chemistry, physics, and earth and space sciences and their interrelationships.
- Recognize and participate in scientific endeavors which are evidence-based and encourage inquiry that leads to a greater understanding of the world.
- Identify and solve problems through scientific exploration, including the formulation of hypotheses, design of experiments, use of technology, analysis of data and drawing of conclusions.
- Select and properly use appropriate laboratory technology, equipment, and materials.
- Understand and utilize, when appropriate, existing and emerging technologies.
- Analyze the possibilities and limits of science and technology in order to make and defend decisions about societal issues.
- Understand that the way in which scientific knowledge is formulated is crucial to the validity of the knowledge.

Science Content Standards

Groton Public Schools

The Nature of Science:

Students will experience an inquiry based learning environment in which they are free to ask questions, seek information, and validate explanations in thoughtful and creative ways. Students also will understand that the processes, ways of knowing and conceptual foundations of science are interdependent and inextricably bound.

Earth Science:

Students will understand the structure, processes and forces that shape our ever changing universe. Students will understand the dynamic processes that effect changes to the atmosphere, hydrosphere and geosphere of our planet.

Chemistry:

Students will know the types and phases of matter and how energy interacts with each. Students will understand that the structure of matter determines the interrelationships with other forms of matter. Students will be able to carry these concepts into global patterns and system seen on our planet.

Physics:

Students will understand that energy and matter are not created or destroyed but can be transformed or transferred throughout the universe. Students will understand the relationships that exist between electricity, electromagnetic energies and magnetism.

Global Interdependence:

Students will understand the interrelationships between the matter and energy in the spheres and the use of resources by society. Students will evaluate the pros and cons of technology's effects on our environment.

Proposed Text:

Miller, K.R. and Levine, J.L. (2006) Biology Pearson-Prentice Hall; Upper Saddle River.

- Resources include teacher and student text, lab manuals and study/reinforcement guides. A companion, exam test-generator (also provided) should be installed onto teacher machines.
- Companion Online Site: <http://www.millerandlevine.com/intro.html>

Evidence of Student Learning:

The course will use student, teacher, and text designed labs, quizzes, tests, multi-media projects, supplemental text reading and teacher constructed materials to evaluate student performance. Assessments are designed to differentiate according to students' learning styles, interests, communication skills, etc.

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Curriculum Map

INTRODUCTION

Course Title: **Honors and General Biology 1**
Curriculum Area and Grade: **Science/10th Grade**

Course Purpose:

The purpose of Honors and General Biology taught at Fitch Senior High School is to promote a lifelong interest in global issues pertaining to life sciences. The scope and sequence of this course will allow for the continuation of students to develop basic explanations of natural phenomenon while continuing development of skill sets that allow students to collect, analyze, represent and utilize data. Students will be able to use this data to interpret and explain biological concepts. Students successfully completing Biology will have the ability to integrate scientific literacy and competencies while providing students with the knowledge and intellectual tools to apply scientific skills, processes, and methods of inquiry to real world settings. It develops young people who are free to ask questions, seek information, and validate explanations in thoughtful and creative ways. The students will understand the relationship of science to other curriculum areas and transfer knowledge across subject areas.

The Biology curriculum outlines skills, strategies, and competencies needed to meet the scientific demands of the 21st Century.

The course will be presented at two ability levels – General and Honors. Presentation of course topics will be made by the teacher to match ability level of students in the class.

Major Learning Goals and Understandings:

Biology will encompass three strands of the Connecticut Common Core of learning.

***Scientific Inquiry, Literacy and Numeracy**

***Cell Chemistry and Biotechnology**

***Genetics, Evolution and Biodiversity**

Students will perform three of the State's embedded performance tasks with additional opportunities to design labs, analyze results mathematically and present data. Students will learn how to research topics using a variety of resources and evaluate the validity of those resources.

Units/Theme/Chapter/Concept and # of Weeks

Quarter = 9 weeks, Semester=18 weeks, Trimester= 12 weeks, Year=36 weeks --- usually spread over 40 weeks

1. Introduction to Bio. and Basic Chemistry	2. Organic Chemistry
3. Cell Structure, Function and Energy	4. DNA, Protein Synthesis and Cell Division
5. Genetics	6. Evolution and Classification
7. Human Populations (Required Activity)	8. Simple Organisms (If Time)

UNIT 1– Introduction to Biology and Basic Chemistry

Part 1 – Introduction to Biology and Basic Chemistry			
Grade: 10	Subject: Biology - Science	Course: Honors and General Biology 1	Length of Unit: 2 to 2.5 weeks

Big Idea (BI) and Essential Questions (EQ)
<ul style="list-style-type: none"> • BI <p>BI1: Scientific Inquiry, Literacy, Numeracy is a search for solutions and/or predictions concerning observed problems and communicating that information to others.</p> <p>BI2: All living things are composed of matter in unique arrangements.</p> • EQ <p>EQ1: How is scientific knowledge created and communicated?</p> <p>EQ2: How does the structure of matter affect the properties and uses of materials?</p>

Part 2 – Standards		
Standards for this unit	Key (GLE) Content Knowledge and Concepts/Skills	
<p><i>Bold Face indicates priority standards</i></p> <p><u>CT Grades 9-10 Core Scientific Inquiry, Literacy and Numeracy.*</u></p> <p>Scientific Inquiry</p> <p>Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena.</p> <p>Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation.</p> <p>Scientific inquiry requires the sharing of findings and ideas</p>	<p>The students will know:</p> <ol style="list-style-type: none"> 1. The Goal of Science (with respect to Biology). 2. The parts of an atom. 3. Differentiate between elements, compounds, molecules, mixtures, solutions and suspensions. 4. The type's chemical bonds and describe their differences. 5. Water is a polar molecule and describes the characteristics that make it polar. 6. The properties of water and describe the importance of those properties to living things. 	<p>The students will be able to:</p> <ol style="list-style-type: none"> 1. Demonstrate use of the scientific method by formulating a hypothesis and related set of experimental procedures to solve a problem 2. From above, create a properly formatted and organized Lab Report.* 3. Assess whether something is living (Biotic) or non-living Abiotic) using the characteristics of life. 4. Explain and describe different tools of a biologist, including the different types of microscopes. And then use those tools to collect data. 5. Demonstrate proper lab safety and techniques. <p>Covers Connecticut Frameworks</p>

<p>for critical review by colleagues and other scientists.</p> <p>Scientific Literacy</p> <p>Scientific literacy includes the ability to read, write, discuss and present coherent ideas about science.</p> <p>Scientific literacy also includes the ability to search for and assess the relevance and credibility of scientific information found in various print and electronic media.</p> <p>Scientific Numeracy</p> <p>Scientific numeracy includes the ability to use mathematical operations and procedures to calculate, analyze and present scientific data and ideas.</p> <p><u>CT Grade 9, Strand 2</u></p> <p>9.4 - Atoms react with one another to form new molecules.</p> <p><u>Enrichment</u></p> <p>High School Chemistry, Atomic and Molecular Structure:</p> <p>The periodic table displays the elements</p>		<p>Expected Performances (D INQ. 1 – D INQ . 10)*</p>
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in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.		
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Part 3 – Common Unit Assessments

Pre-test on unit. [Intro.doc](#)

C.F.A. #1 – “Testing for Vitamin C” (Reading for Information, Lab Protocols).

Link:http://www.sde.ct.gov/sde/lib/sde/pdf/bestseminars/sc/2006_capt_vitamin_c.pdf

Unit 1 Test – “Introduction and Basic Chemistry”

Honors Link: [Honors Biology Unit 1: Intro and Basic Chem](#)

General Link: [General Biology Unit 1 Exam: Intro up to Chem](#)

Part 4 – Common/Assured Learning Experiences

- 1.) Movie: Introduction to Lab. Safety - Life Sciences (2005) Flinn Scientific and Championship Productions. School Library Code; VF 502.8 Int.
 - 2.) A Graphing Lab. Example^: “Using Graphing Skills” (2006) Laboratory Manual A, Biology Pearson/Prentice Hall, pages 49-54.
 - 3.) A Lab Safety Activity. Example^: “Recognizing Laboratory Safety” (2006) Laboratory Manual A, Biology Pearson/Prentice Hall, pages 19 - 22.
 - 4.) Activities introducing lab equipment and their use.

“Identifying Laboratory Equipment” (2006) Laboratory Manual A, Biology Pearson/Prentice Hall, pages 23- 26.

“Making Metric Measurements” (2006) Laboratory Manual A, Biology Pearson/Prentice Hall, pages 27- 30.
 - 5.) An Introduction to Microscope Lab. Example^: “Using a Compound Light Microscope” (2006) Laboratory Manual A, Biology Pearson/Prentice Hall, pages 35 - 40.
 - 6.) An Activity Introducing the Scientific Method. Example^: “Applying the Scientific Method” (2006) Laboratory Manual A, Biology Pearson/Prentice Hall, pages 31 - 33.
 - 7.) An Activity Using the Periodic Table. Review of Atoms and the periodic table.
- ^Example activities under Part 4 – Common/Assured Learning Experiences are suggested or used by many of the department, but can be modified/replaced with other activities per teacher discretion. Subsequent units will have similar references.

Part 5 – Teacher Notes

General Notes

- Assigned Readings: **Class Textbook:** Chapter 1 thru chapter 2, sects. 3 and 4.
- Lecture Notes/PowerPoint Presentations.
[Scientific Method](#)
[Scientific Method and Graphing](#)

Embedded Technology and Web Resources:

- Optical Microscopy Primer: Website with images and tutorials on Microscope Techniques (Compound and Electron).
<http://micro.magnet.fsu.edu/primer/index.html>
- Atomic Structure: Applet on parts of an atom.
<http://phet.colorado.edu/en/simulation/ph-scale>

- pH – Understanding Acidic and Basic Solutions. Applet on acidic and basic solutions and measuring pH changes.
<http://phet.colorado.edu/en/simulation/acid-base-solutions>
<http://phet.colorado.edu/en/simulation/ph-scale>

Embedded Literacy

Examples on non-text readings that apply to this unit.*

- On how and why scientists publisher their findings, changing methods:
 Gorman, J. (2001) “The End of Good Science” Science News Online, vol.159, no. 5, p.58.

http://www.phschool.com/science/science_news/articles/good_science.html

- On experimental design:

Milius, S (2003) “Leashing the Rattlesnake: a behind the scenes look at experimental design” Science News Online, Vol. 164 No. 13, p. 200.

http://www.phschool.com/science/science_news/articles/leashing_rattlesnake.html

- Other resources can be found at:

Connecting News with National Science Standards

<http://expertvoices.nsdl.org/connectingnews/>

The New York Times Daily Lesson Plan

<http://query.nytimes.com/gst/learning.html>

Calibrated Peer Review (reading and writing-free and online)

<http://cpr.molsci.ucla.edu/>

Science News Online

<http://www.sciencenews.org/>

* Core Scientific Literacy, Inquiry and Numeracy are key themes that should be embedded through-out the course, units and activities.

Common Misconceptions:

- Intro to Science/Biology:

Students may believe that there is only one, linear way to do science (Scientific Method) and that the purpose of study is to only validate something being taught (not to gain knowledge or understanding in all outcomes, valid or not).¹

Students consider movement as a characteristic of life, applied as criteria to define life.²

- Basic Chemistry:

Difficulties in shifts of view/understanding from macroscopic (observable) world and microscopic world (non-observable), students do not associate chemistry as being a part of, or surrounding, themselves.³

Understanding of chemistry is overly generalized³, point these out and emphasize goal of understanding for Biology (rather than all implications in chemistry).

- Sources

“Misconceptions and missing conceptions about the process of science” (2011)
The Process of Science: Vision Learning.
http://serc.carleton.edu/sp/process_of_science/misconceptions.html

Keeley, P., F. Eberle and L. Farrin (2005) Uncovering Student Ideas in Science
vol 1. NSTA Press, Arlington.

T. LEVY NAHUM, A. HOFSTEIN, R. MAMLOK-NAAMAN, and Z. BAR-DOV (2004) “Can Final Examinations Amplify Students’ Misconceptions in Chemistry?” Chemistry Education: Research and Practice, Vol. 5, No. 3, pp. 301-325.

The Lehmann Group, Dept. of Chemistry UVA: Bad Chemistry

<http://faculty.virginia.edu/lehmannlab/badchemistry.html>

UNIT 2– Organic Chemistry

Part 1 – Organic Chemistry			
Grade: 10	Subject: Biology – Science	Course: Honors and General Biology 1	Length of Unit: 2 weeks

Big Idea (BI) and Essential Questions (EQ)

- **BI** - Living things are based on the chemical properties of carbon compounds.
- **EQ** - How does the structure of matter affect the properties and uses of organic/carbon compounds?

Part 2 – Standards		
Standards for this unit	Key (GLE) Content Knowledge and Concepts/Skills	
<p><i>Bold Face indicates priority standards</i></p> <p>CT Grade 9, Strand 2</p> <p>9.5 – Due to its unique chemical structure, carbon forms many organic and inorganic compounds.</p> <p><u>Enrichment</u></p> <p>High School Chemistry, Organic Chemistry and Biochemistry:</p> <p>The bonding characteristics of carbon allow the formation of many different organic molecules of varied sizes, shapes and chemical properties, and provide the biochemical basis of life.</p>	<p>The students will know:</p> <ol style="list-style-type: none"> 1. Describe the functions and characteristics of each type of organic molecule. 2. Explain the role and importance of enzymes to living things and their metabolic cell process. 	<p>The students will be able to:</p> <ol style="list-style-type: none"> 1. Construct examples of three organic molecules, lipids, carbohydrates and proteins, using molecular model kits. (See below Common learning experiences #1). 2. Create a properly formatted and organized Lab Report.* (Apple Juice Lab). <p>Covers Connecticut Frameworks Expected Performances (D INQ. 1 – D INQ . 10)*</p>

Part 3 – Common Unit Assessments

Pre-test on unit. [Pretest Intro to Organic Chemistry](#)

Apple Juice Lab graded using Lab Rubric (see below).

Unit 2 Test – “Organic Chemistry”

Honors Link: [Post Summative Tests/Honors Biology Unit 2 Organic Chem.pdf](#)

General Link: [Post Summative Tests/General Biology Unit 2 Organic Chem.pdf](#)

Part 4 – Common/Assured Learning Experiences

- 1.) Molecular Models: Students will use kits and a guided exercise to build/construct models of organic molecules, allowing them to compare structures and bonding reactions.

Molecules of Life (Molecular Model Guide) (1995) W.N.S.E.; p 1-8.

[Labs/Unit 2 Organic Molecules Models.pdf](#)

- 2.) Apple Juice Lab: (Embedded CAPT assignment) Students will explore the effects of two different enzymes on the production of apple juice from apple sauce. In this lab, students will be given a brief objective and materials to design and conduct an experiment. The lab protocol is up to the students (Source Below under teacher notes).

“Enzymes, Laboratory Activity” Strand 4: Cell Chemistry and Biotechnology Grade 9-10 Curriculum Embedded Tasks. Conn. Dept. of Edu.

<http://www.sde.ct.gov/sde/cwp/view.asp?a=2618&q=320890> , 8/10/2009.

Part 5 – Teacher Notes

General Notes

- Assigned Readings from **Class Textbook**: Chapter 2, Sections 3 and 4, pages 44-53.
- Other Actives per Teacher Discretion.
“Identifying Organic Compounds” (2006) Laboratory Manual A, Biology
Pearson/Prentice Hall, Pages 59-64.
- Lecture Notes/PowerPoint Presentations.

Embedded Technology and Web Resources:

<http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookCHEM2.html>

Embedded Literacy

- Examples on non-text readings that apply to this unit.*

Glucose, Health and Technology:

Goho, A. (2005) "Sweet Glow: Nanotube sensor brightens path to glucose detection" Science News Online; Vol 167, No. 1, p.3.

http://www.phschool.com/science/science_news/articles/sweet_glow.html

Other resources can be found at:

Connecting News with National Science Standards

<http://expertvoices.nsd.org/connectingnews/>

The New York Times Daily Lesson Plan

<http://query.nytimes.com/gst/learning.html>

Calibrated Peer Review (reading and writing-free and online)

<http://cpr.molsci.ucla.edu/>

Science News Online

<http://www.sciencenews.org/>

- * Core Scientific Literacy, Inquiry and Numeracy are key themes that should be embedded through-out the course, units and activities.

Common Misconceptions:

- Organic Chemistry:

Threshold Concepts and Troublesome Knowledge in Chemistry Karen Moss, C Greenall, A Rockcliffe

<http://www.heacademy.ac.uk/assets/ps/documents/events/vce07presentations/moss.pdf>

- Sources

Common Biology Misconceptions

<http://departments.weber.edu/sciencecenter/biology%20misconceptions.htm>

Children's Ideas in Science: General Misconceptions in Science in a wide range of Science Topics including the Chemistry of Biology, V. Talsma

<http://homepage.mac.com/vtalsma/misconcept.html>

UNIT 3– Cell Structure, Function and Energy

Part 1 – Cell Structure, Function and Energy			
Grade: 10	Subject: Biology – Science	Course: Honors and General Biology 1	Length of Unit: 3-4 weeks

Big Idea (BI) and Essential Questions (EQ)
<ul style="list-style-type: none"> • BI - Cells are the basic unit of living structure and function. • EQ - How are organisms structured to insure efficiency and survival?

Part 2 – Standards		
Standards for this unit	Key (GLE) Content Knowledge and Concepts/Skills	
<p><i>Bold Face indicates priority standards</i></p> <p><u>CT Grade 10, Strand 4</u></p> <p>10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.</p> <p><u>Enrichment</u></p> <p>High School Biology, Cell Biology</p> <p>The fundamental life processes of plants and animals depend on a variety of chemical reactions that occur in specialized areas of the organism’s cells.</p> <p>High School Biology, Ecology</p> <p>Stability in an</p>	<p>The students will know:</p> <ol style="list-style-type: none"> 1. Cell theory is a major unifying theme in Biology. 2. There are different types of Prokaryotes which differ in structure from Eukaryotes. 3. Eukaryotes have specific cell structures which perform life functions called organelles. 4. The cell membrane is responsible for osmosis, facilitated diffusion and active transport. 5. Eukaryotic cells vary in structure and specialization. 6. Trophic interactions affect how organisms differ in the way they get their energy. 7. State the overall reaction of photosynthesis. 8. Describe the structure and function of the chloroplast and the role of chlorophyll. 9. State the overall reaction of cellular respiration. 10. Describe the structure and 	<p>The students will be able to:</p> <ol style="list-style-type: none"> 1. Differentiate between Eukaryotes from Prokaryotes. 2. Identify and classify Prokaryotes according to structure and shape. 3. Compare and contrast structure and function of organelles. 4. Predict what substances can enter and exit the cell. 5. Describe organizational levels in Eukaryotic Organisms. 6. Diagram and describe the carbon dioxide cycle, the water cycle and explain the processes where plants get their energy to survive. 7. Compare the products and reactants of the light and dark reaction and how these two reactions relate. 8. Compare photosynthesis and cellular respiration and

<p>ecosystem is a balance between competing effects.</p>	<p>function of the mitochondria.</p> <ol style="list-style-type: none"> 11. Name two main types of fermentation. 12. Identify three path ways the body uses to release energy during exercise. 	<p>their role in the oxygen cycle.</p> <ol style="list-style-type: none"> 9. Predict how oxygen debt will affect a eukaryote. 10. Design and communicate data through an experimental design that Identify factors that affect the rate of photosynthesis. <p>Covers Connecticut Frameworks Expected Performances (D INQ. 10)</p> <ol style="list-style-type: none"> 11. Articulate conclusions and explanations based on scientific data regarding factors such as temperature and water availability. (D INQ. 9)
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Part 3 – Common Unit Assessments

Pre-test on unit

Unit 3 Test: “Cells and Cell Energy”

Honors Link: [Post Summative Tests\Honors Biology I Unit 3 Exam Cell Structure to Energy.doc](#)

General Link: [Post Summative Tests\General Biology Unit 3 Exam Cell Structure to Energy.doc](#)

Part 4 – Common/Assured Learning Experiences

- 1.) An activity that introduces the cell basic parts and organelles. Examples include Virtual Cell Dissection, posters, models, brochures and/or PowerPoint Presentations that summarize what students have learned from this section.
- 2.) A lab that compares plant and animal cells. Example “Comparing Plant and Animal Cells” (1995) Laboratory Manual: Biology Prentice Hall, Pages 99-104.

From previous edition of textbook and lab manual.

- 3.) An activity that highlights the role of pigments in photosynthesis/plants. Example “Plant Pigments” (1995) Laboratory Manual: Biology Prentice Hall, Pages 105-108.

From previous edition of textbook and lab manual

Part 5 – Teacher Notes

General Notes

- Assigned Readings from **Class Textbook**: Chapter 7, 8 and 9.
- Lecture Notes/PowerPoint Presentations.
- Other Actives per teacher discretion.

Lab on photosynthesis. Example: “Measuring the Effect of Light Intensity on Photosynthesis” (2006) Laboratory Manual A, Biology Pearson/Prentice Hall, Pages 91-94.

Embedded Technology and Web Resources:

- Virtual Cell Dissection: www.ibiblio.org/virtualcell .
- Applet/Simulation on Cell Membranes and how Cellular Channels can control rates of diffusion through a membrane. <http://phet.colorado.edu/en/simulation/membrane-channels>

Embedded Literacy – Examples on non-text readings that apply to this unit.*

- Website dedicated to explanation of Biology related topics; Buzzle .com
<http://www.buzzle.com/articles/photosynthesis-for-kids.html>
<http://www.buzzle.com/articles/photosynthesis-diagram.html>
<http://www.buzzle.com/articles/photosynthesis-and-cellular-respiration.html>
- Scientific research pdf which shows how abstracts are created and how scientific information is disseminated regarding factors that affect photosynthesis.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1066080/pdf/plntphys00559-0136.pdf>
- The cycles and how it affects photosynthesis and respiration.
http://earthobservatory.nasa.gov/Features/CarbonCycle/carbon_cycle.php
- Other resources can be found at:
Connecting News with National Science Standards
<http://expertvoices.nsd.org/connectingnews/>
The New York Times Daily Lesson Plan
<http://query.nytimes.com/gst/learning.html>
Calibrated Peer Review (reading and writing-free and online)
<http://cpr.molsci.ucla.edu/>
Science News Online
<http://www.sciencenews.org/>

* Core Scientific Literacy, Inquiry and Numeracy are key themes that should be embedded through-out the course, units and activities.

Common Misconceptions:

- Cells:

Living things “contain” cells, rather than being made up of cells.¹

Student may have trouble with differences, or hierarchical structure, between cells and molecules.¹ Also, students may fail to realize that cells, and cell structures, are made of molecules.²

Students may have poor understanding (grasp) of cells as the basic unit of function in living things.¹

Students only think in terms of Plant and Animal cells.⁵

- Cell Energy (Photosynthesis and Respiration):

Students fail to understand that CO₂ and water provide the mass (material for) of plants and for use in making food in photosynthesis. Common, related misconceptions is that CO₂ (gas) has negligible mass so has small contribution to plant mass and that plant food is “eaten” absorbed thru soil rather than a product of photosynthesis.³

Students believe that plants photosynthesis and animals carry out cellular respiration. They Fail to understand that plants actually do both.⁴

- Sources:

Keeley, P., F. Eberle and L. Farrin (2005) Uncovering Student Ideas in Science vol 1. NSTA Press, Arlington.

http://evolution.berkeley.edu/evolibrary/misconceptions_faq.php

Keeley, P., F. Eberle and J. Tugel (2007) Uncovering Student Ideas in Science vol 2. NSTA Press, Arlington.

Keeley, P., et. Al (2009) Uncovering Student Ideas in Science vol 4. NSTA Press, Arlington.

Berthelsen, B (1999) Students Naïve Conceptions in Life Science. MSTJ Journal 44 (1) pp 13-19. www.msta-mich.org.

UNIT 4– DNA Protein Synthesis and Cell Division

Part 1 - DNA Protein Synthesis and Cell Division			
Grade: 10	Subject: Biology - Science	Course: Honors and General Biology 1	Length of Unit: 2-3 weeks

Big Idea (BI) and Essential Questions (EQ)

- **BI** - All living things are based on a universal genetic code that drives biochemistry and reproduction.
- **EQ** - What processes are responsible for life's unity and diversity?

Part 2 – Standards		
Standards for this unit	Key (GLE) Content Knowledge and Concepts/Skills	
<p><i>Bold Face indicates priority standards</i></p> <p><u>CT Grade 10, Strand 4</u></p> <p>10.3 - Similarities in the chemical and structural properties of DNA in all living organisms allow the transfer of genes from one organism to another.</p> <p><u>Enrichment</u></p> <p>High School Biology, Genetics:</p> <p><u>Mutation and sexual reproduction</u> lead to genetic variation in a population</p> <p>Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism</p>	<p>The students will know:</p> <ol style="list-style-type: none"> 1. The structure of DNA lends itself to be replicated, repaired and copied exactly. 2. DNA is the code for life via the blueprints for making proteins through an intermediary RNA. 3. Summarize the events of DNA replication. 4. Protein synthesis is a process which DNA is transcribed to RNA and then proteins are created via translation. 5. Mutations are any changes to DNA. 6. Bacteria use a system of negative feedback to regulate lactose metabolism and other life functions. 7. Eukaryotes create pieces of RNA that are then modified to “code” for a protein. 8. Cell size is one factor in affecting when a cell divides. 9. Name and describe the major events of the cell cycle, including the parts of interphase, mitosis and cytokinesis and meiosis. 10. Define cancer. 	<p>The students will be able to:</p> <ol style="list-style-type: none"> 1. Compare and contrast the structures and functions of DNA, RNA and Proteins. 2. Describe the general role of DNA and RNA in protein synthesis. 3. Describe the general role of enzymes in metabolic cell processes. Covers Connecticut Frameworks Expected Performances (D 28 and D 29) 4. “Decode” a sample DNA base sequence through RNA and using codons create a polypeptide sequence. 5. Compare and contrast gene regulation in prokaryotes and eukaryotes. 6. Measure data regarding cell size, plot the data and explain how this affects life functions. 7. Describe factors affecting cell division. 8. Compare and Contrast Mitosis and Meiosis (C 25.) 9. Contrast the end products of meiosis and mitosis and how each is related to the biology of an organism.

Part 3 – Common Unit Assessments

Pre-test on unit

Unit 4 Test: “DNA to Cell Division”

Honors Link: [Honors DNA to Cell Division](#)

General Link: [General Biology Unit 4 Exam DNA to Cell Division version 2](#)

Part 4 – Common/Assured Learning Experiences

1) Nucleic Acids and Protein Synthesis Labs

Example^: “Assembling a Protein Molecule” (1995) Laboratory Manual: Biology Prentice Hall, Pages 113 - 116.

Example^: “Simulating Protein Synthesis” (1995) Laboratory Manual: Biology Prentice Hall, Pages 117 – 120.

2) Compound Microscope Lab - Example^: “Determining the Time Needed for Mitosis” (1995) Laboratory Manual: Biology Prentice Hall, Pages 125 – 128.

3) Lab Activity – Surface Area to Volume Ratio Example – Teacher generated worksheets

Part 5 – Teacher Notes

General Notes

Teacher Note: The sequence of this unit falls out of line with the currently approved book. First Chapter 12 is covered (DNA) and protein synthesis, followed by Chapter 10 (Cell Growth and Division/Mitosis) and the unit finishes with Chapter eleven, section four (Meiosis).

- Assigned Readings from **Class Textbook**:
Chapter 12 (All Sections, pages 286-317), Chapter 10 (All Sections, Pages 240-259) and Chapter 11 (Section 4, Pages 275-278).
- Other Activities per teacher discretion:
Extracted DNA Lab (optional) Example^: “DNA Extraction” (2006) Laboratory Manual A: Biology Pearson/Prentice Hall, Pages 113 – 118.
- Lecture Notes/PowerPoint Presentations.
Web resource for notes and activities <http://www.dnai.org/index.htm>

Embedded Technology and web resources.

- Gene Expression Applet/Simulation. Students can explore how the Lac Operon works and then how mutations can change its function.

<http://phet.colorado.edu/en/simulation/gene-machine-lac-operon>
- DNA ancestry project

<http://www.dnaancestryproject.com/>
- Collection of activities and projects for students

<http://www.surfnetkids.com/dna.htm>
- Tutorial on Mitosis

http://www.biology.arizona.edu/cell_BIO/tutorials/cell_cycle/cells3.html

Embedded Literacy – Examples on non-text readings that apply to this unit.*

- Set of DNA articles that relate to lineage, cloning and other modern techniques and problems. <http://topics.nytimes.com/top/news/national/series/dnaage/index.html>
- DNA and its relevance to criminal cases. <http://articles.cnn.com/keyword/dna>

Current events regarding DNA technology and the modern world.

http://topics.nytimes.com/topics/news/science/topics/dna_deoxyribonucleic_acid/index.html

- Mitosis slides and explanations. <http://biology.about.com/od/mitosis/ss/mitosisstep.htm>
- Website dedicated to Biology topics including Mitosis and Meiosis. <http://www.buzzle.com/articles/cell-division-stages.html>
- From the cell cycle through Cytokinesis explained. <http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookmito.html>
- Other resources can be found at:

Connecting News with National Science Standards
<http://expertvoices.nsd.org/connectingnews/>

The New York Times Daily Lesson Plan
<http://query.nytimes.com/gst/learning.html>

Calibrated Peer Review (reading and writing-free and online)
<http://cpr.molsci.ucla.edu/>

Science News Online
<http://www.sciencenews.org/>

* Core Scientific Literacy, Inquiry and Numeracy are key themes that should be embedded through-out the course, units and activities.

Common Misconceptions:

- DNA and Protein Synthesis

On cloning

<http://library.thinkquest.org/C0122429/science/misconceptions.htm>

General biology misconceptions

<http://homepage.mac.com/vtalsma/misconcept.html>

Cell Division (Mitosis and Meiosis)

Students may believe that organisms grow by enlarging their cells. They have difficulty understanding/connecting organism growth with cell division (adding more cells) or how cell differentiation applies in an organisms growth.²

- Sources

http://evolution.berkeley.edu/evolibrary/misconceptions_faq.php

Berthelsen, B (1999) Students Naïve Conceptions in Life Science. MSTA Journal 44 (1) pp. 13-19. www.msta-mich.org.

Keeley, P., F. Eberle and L. Farrin (2005) Uncovering Student Ideas in Science vol 1. NSTA Press, Arlington.

Keeley, P., F. Eberle and J. Tugel (2007) Uncovering Student Ideas in Science vol 2. NSTA Press, Arlington.

Keeley, P and J. Tugel (2009) Uncovering Student Ideas in Science vol 4. NSTA Press, Arlington.

- Pertinent Videos in the library Collection

Cracking the Code of Life (2001) NOVA. School Library Code; VF 611 Cra.

Cell Division: Mitosis and Cytokinesis (2004) Assistant Professor Series. School Library Code; DVD 571.8 Cel.

UNIT 5– Genetics

Part 1 – Genetics			
Grade: 10	Subject: Biology - Science	Course: Honors and General Biology 1	Length of Unit: (# of weeks)

Big Idea (BI) and Essential Questions (EQ)
<ul style="list-style-type: none"> • BI - Organisms inherit traits in predictable patterns. • EQ - What processes are responsible for life’s unity and diversity?

Part 2 – Standards		
Standards for this unit	Key (GLE) Content Knowledge and Concepts/Skills	
<p><i>Bold Face indicates priority standards</i></p> <p><u>Grade 10,</u> <u>Strand 5</u></p> <p>10.4. - In sexually reproducing organisms, each offspring contains a mix of characteristics inherited from both parents.</p> <p><u>Enrichment</u></p> <p>High School Biology, Genetics:</p> <p>Mutation and sexual reproduction lead to <u>genetic variation</u> in a population</p> <p>A multicellular organism develops from a single zygote, and its phenotype depends on its genotype, which is</p>	<p>The students will know:</p> <ol style="list-style-type: none"> 1. Summarize Mendel’s principals of genetics. 2. Probability is a way to describe how often an occurrence happens. 3. Genetics involves describing probable outcomes. 4. Understand the chromosomal theory of inheritance. 5. Crossing over is important process to keep variation within a species. 6. Scientists are able to use techniques to manipulate DNA. 7. Sex determination is through chromosome pair 23 in humans and is responsible for sex linked traits. 8. Human genetic traits and disorders are studied through various methods like karyotypes, pedigrees and gene studies. 9. Human genetic disorders result 	<p>The students will be able to:</p> <ol style="list-style-type: none"> 1. Use Mendel’s principles to explain heredity. 2. Use a Punnet Square to predict genetic outcomes. 3. Simulate crosses and probabilities using genetic principles. 4. Describe the principles of independent assortment, the technique of gene mapping and simulate dihybrid crosses. 5. Explain the purpose of selective breeding techniques and describe these different techniques and outcomes. 6. Compare, contrast and describe research that led to the discovery of the structure of DNA and its function. 7. Explain and use data from probability and pedigrees to determine if a trait is sex linked. 8. Compare and contrast different human genetic disorders via

<p>established at fertilization.</p> <p>The genetic composition of cells can be altered by incorporation of exogenous DNA into the cells.</p>	<p>from either single gene mutations or whole chromosomal mutations due like nondisjunctions.</p> <p>10. Describe the Human Genome Project.</p>	<p>karyotyping.</p> <p>9. Define transgenic and GMO and how these organism are useful to humans.</p> <p>10. Describe the ethics behind the use of gene manipulation techniques.</p>
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Part 3 – Common Unit Assessments

Pre-test on unit

Genetically Modified Foods Brochure (See Below).

Unit 5 Test: “Genetics”

Honors Link: [Honors Biology Unit 5 Exam Genetics](#)

General Link: [General Biology Unit 5 Exam Genetics](#)

Part 4 – Common/Assured Learning Experiences

- 1.) Genetically Modified Foods – (Embedded CAPT activity) Students will research the agreement of using genetically modified foods for human consumption and whether those foods should be required to have labels informing consumers. Typically students would complete a brochure detailing their stance and supporting materials, though any media type (poster/PowerPoint) could be used per teacher discretion/preference. (Source in teacher notes).

“Labeling Genetically Altered Foods, STS Activity” [Grade 9-10 Curriculum Embedded Tasks](#). Conn. Dept. of Edu. <http://www.sde.ct.gov/sde/cwp/view.asp?a=2618&q=320890> , 8/10/2009.

General misconceptions about organic grown foods which models how the student shall address creating a brochure.

http://www.ifoam.org/growing_organic/1_arguments_for_oa/criticisms_misconceptions/Misconceptionscompiled_JKA_20090112.pdf

- 2.) Movie (Required) “Genetically Modified Foods” [The Eyes of Nye Series](#) (2005) Disney Educational Productions; School Catalog DVD 664 Gen.

Part 5 – Teacher Notes

General Notes

Assigned Readings from **Class Textbook**: Chapter 12, 10 and section 11-4.

- Lecture Notes/PowerPoint Presentations.

Embedded Technology and Web Resources:

- STS activity on Genetically Modified Foods (see above). Students will use internet to research view points and then generate a brochure detailing the arguments they uncover.
- Basics and activities to discover the principles of genetics.
<http://www.thetech.org/exhibits/online/topics/index.html>
- Various topics and activities and animations on Biology topics including Genetics.
http://thinkquest.org/pls/html/f?p=52300:30:3609949873523834::::P30_CATEGORY_ID:CPJ_LIFE_SCIENCE

Embedded Literacy – Examples on non-text readings that apply to this unit.

- On Gene Therapy (Doping) and Athletes
Brownlee, C. (2004) “Gene Doping: Will athletes go for the ultimate high?” Science News Online Vol. 166 No. 16, p. 196.
http://www.phschool.com/science/science_news/articles/gene_doping.html
- Rich resource involving multiple articles and simulations on Genetics and other Biology topics.
<http://www.buzzle.com/articles/human-genetics/>
- Brief articles covering multiple topics in genetics.
http://www.biology-online.org/kb/biology_articles/genetics.html
- Collection of articles on various science topics including genetics.
<http://www.thetech.org/exhibits/online/topics/index.html>
- Other resources can be found at:
 - Connecting News with National Science Standards
<http://expertvoices.nsd.org/connectingnews/>
 - The New York Times Daily Lesson Plan
<http://query.nytimes.com/gst/learning.html>
 - Calibrated Peer Review (reading and writing-free and online)
<http://cpr.molsci.ucla.edu/>
 - Science News Online
<http://www.sciencenews.org/>

* Core Scientific Literacy, Inquiry and Numeracy are key themes that should be embedded through-out the course, units and activities.

Common Misconceptions:

- Genetics/Heredity
 - “Students do not distinguish between [Understand] sexual and asexual reproduction.”¹
 - “Daughters get most of genes from mother; sons get most of genes from father”.¹
 - “Disconnect between genetic concepts (probabilities and inheritance patterns) and human situations”.¹
 - “Lack of understanding between the relationship between DNA, Genes and Chromosomes”.¹
- Sources
 - Berthelsen, B (1999) Students Naïve Conceptions in Life Science. MSTJ Journal 44 (1) pp. 13-19. www.msta-mich.org.

UNIT 6– Evolution and Classification

Part 1 – Evolution and Classification			
Grade: 10	Subject: Biology – Science	Course: Honors and General Biology 1	Length of Unit: 1-2 Weeks

Big Idea (BI) and Essential Questions (EQ)
<ul style="list-style-type: none"> • BI - Living things have changed over time based on their environment. • EQ <ul style="list-style-type: none"> EQ1: What processes are responsible for life’s unity and diversity? EQ2: How is scientific knowledge created and communicated? (<i>Classification</i>)

Part 2 – Standards		
Standards for this unit	Key (GLE) Content Knowledge and Concepts/Skills	
<i>Bold Face indicates priority standards</i> Grade 10, Strand 5 10.5 - Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.	The students will know: <ol style="list-style-type: none"> 1. Evolution is the explanation on how species came to be. 2. Darwin’s theory of evolution was influenced by multiple other theories and observations. 3. Define evolution and identify evidence in support of 	The students will be able to: <ol style="list-style-type: none"> 1. Compare and contrast the ideas of Lamarck and Darwin. 2. Explain how certain traits came to be using the idea of inheritance of acquired characteristics and natural selection. 3. Predict what happens to alleles

<p>10.6 - Living organisms have the capability of producing populations of unlimited size, but the environment can support only a limited number of individuals from each species.</p> <p><u>Enrichment</u> High School Biology, Evolution:</p> <p>The frequency of an allele in a gene pool of a population depends on many factors and may be stable or unstable over time. Evolution is the result of genetic changes that occur in constantly changing environments.</p>	<p>Darwin's ideas</p> <ol style="list-style-type: none"> 4. Gene pools are the source of variation in a population. 5. Hardy and Weinberg described genetic equilibrium using an equation. 6. Genetic equilibrium requires maintenance of certain conditions. 7. Extinction occurs and creates patterns of evolution. 8. Linnaeus's classification scheme involved form fitting function and related species being within multiple taxonomic categories. 9. Species are named using binomial nomenclature system developed by Linnaeus. 10. Explain how evolutionary relationships now fit with modern classification. 11. Name the six kingdoms as they are now identified. 	<p>using the Hardy-Weinberg equation when certain factors are change such as population size, genetic drift and catastrophes.</p> <ol style="list-style-type: none"> 4. Explain how natural selection affects single and polygenic gene traits. 5. Compare and contrast types of speciation and mechanisms of speciation. 6. Use a classification key to identify unknown organisms. 7. Explain and predict where a species belongs along an evolutionary tree.
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Part 3 – Common Unit Assessments

Pre-test on unit: [Preevolution](#)

Unit Test - No current version of Honors or General Biology*.

*Typically, due to time constraints, this is the last unit covered in Honors and General Biology 1. The unit test, as a result, is combined with the final exam.

Part 4 – Common/Assured Learning Experiences

- 1.) Activities for exploring classification and using dichotomous keys (examples below).
 - “Classifying Organisms” (1995) Laboratory Manual: Biology Prentice Hall, Pages 193 - 201.
 - “Using and Constructing a Classification key” (1995) Laboratory Manual: Biology Prentice Hall, Pages 203 - 208.

Part 5 – Teacher Notes

General Notes

- Assigned Readings from Class Textbook: Chapter 15 (all sections, Pages 369-391), Chapter 16 (all sections, pages 392-415), Chapter 17 (section 4, pages 435-440) and Chapter 18 (all sections, pages 446-467). Chapter 17 (all remaining sections, pages 416-445) can be assigned for enrichment.
- Lecture Notes/PowerPoint Presentations.
- Other activities per teacher discretion:
 - “Interpreting Events from Fossil Evidence”(1995) Laboratory Manual: Biology Prentice Hall, Pages 167 - 172.
 - “Amino Acid Sequence and Evolutionary Relationships” (1995) Laboratory Manual: Biology Prentice Hall, Pages 173 - 180.

Embedded Technology and Web Resources:

- Applet/Simulation on Natural Selection: Student can manipulate phenotypes, rates of mutation and predation on a population of rabbits.
- <http://phet.colorado.edu/en/simulation/natural-selection>

Embedded Literacy:

- On using DNA to catalog the diversity of life and classification
Brownlee, C. (2004) “DNA Barcodes: Life under the Scanner”
Science News Online, Vol. 166 No. 23, p. 360.
http://www.phschool.com/science/science_news/articles/dna_bar_codes.html
- On variation and evolution
Milius, S (2003) “How the Butterfly gets its Spots: and what they tell us about fate.” Science News Online Vol 163 No 3, p. 35.
http://www.phschool.com/science/science_news/articles/butterfly_gets_spots.html
- Collection of classroom student notes and activities
<http://www.zoology.ubc.ca/~bio336/Bio336/Lectures/Lecture5/Overheads.html>
- Classroom activities covering multiple facets of evolution.
<http://evolution.berkeley.edu/activities.htm>
- Other resources can be found at:
 - Connecting News with National Science Standards
<http://expertvoices.nsd.org/connectingnews/>
 - The New York Times Daily Lesson Plan
<http://query.nytimes.com/gst/learning.html>
 - Calibrated Peer Review (reading and writing-free and online)
<http://cpr.molsci.ucla.edu/>
 - Science News Online
<http://www.sciencenews.org/>

Common Misconceptions:

- Classification:

Common misconception on how students conceptualize classification.

<http://beyondpenguins.nsd.org/issue/column.php?date=January2009&departmentid=professional&columnid=professional!misconceptions>

- Evolution:

“Evolution is a theory about the origin of life.”^{1,3}

“Organisms are always getting ‘better’”.¹

“Evolution happens by ‘chance’”.¹

“Organisms are ‘trying’ to change”.¹ Adaptation are an intention (intentional change) by the organism to satisfy a desire or need to survive.³

“Natural selection gives organisms what the “need””.¹

“Evolution is just [another] theory”, and “It is in crisis (not observable, gaps in support, other theories valid Scientifically)”.¹

“Individuals can adapt to changes in the environment”, “Acquired traits are in heritable”.²

Fitness misinterpreted as meaning physically fit, rather than the ability to survive and reproduce.³

- Sources

http://evolution.berkeley.edu/evolibrary/misconceptions_faq.php

Berthelsen, B (1999) Students Naïve Conceptions in Life Science. MSTA Journal 44 (1) pp. 13-19. www.msta-mich.org.

Keeley, P and J. Tugel (2009) Uncovering Student Ideas in Science vol 4. NSTA Press, Arlington.

- Pertinent Videos*

Evolution-Darwin’s Dangerous Idea (2001) Clear Blue Sky Productions. School Library Code; DVD 576.8 Evo.

*Optional movie typically shown if time.

UNIT 7 – Human Population Dynamics

Part 1 – Human Population Dynamics (Required Activity CAPT)			
Grade: 10	Subject: Biology - Science	Course: Honors and General Biology 1	Length of Unit: >1 week

Big Idea (BI) and Essential Questions (EQ)
<ul style="list-style-type: none"> • BI - Human populations and their impact have increased over time. • EQ - How do science and technology affect the quality of our lives?

Part 2 – Standards		
Standards for this unit	Key (GLE) Content Knowledge and Concepts/Skills	
<i>Bold Face indicates priority standards</i> <u>CT Grade 9, Strand 3</u> 9.8 - The use of resources by human populations may affect the quality of the environment.	The students will know: <ol style="list-style-type: none"> 1. List characteristics that define a population. 2. Describe exponential and logistic growth. 	The students will be able to: <ol style="list-style-type: none"> 1. Identify factors that affect population size, limit or encouraging growth. 2. Explain/describe how human population growth has differed/changed over time and predict how future human population growth patterns.

Part 3 – Common Unit Assessments
Completion of Power Point or Brochure comparing population dynamics of two selected countries (Developing and Developed nations)

Part 4 – Common/Assured Learning Experiences
1.) Human Population Dynamics, STS Activity. “Human Population Dynamics, STS Activity” Strand 5: Genetics, Evolution and Biodiversity, <u>Grade 9-10 Curriculum Embedded Tasks</u> , Conn. Dept. of Edu. http://www.sde.ct.gov/sde/cwp/view.asp?a=2618&q=320890 , 8/10/2009.
2.) Movie: “Population” <u>The Eyes of Nye Series</u> (2005) Disney Educational Productions; School Catalog DVD 304.6 Pop.

Part 5 – Teacher Notes

General Notes

- Assigned Readings from **Class Textbook**: Chapter 5.
- Other activities per teacher discretion
“Yeast Population Dynamics, Laboratory Activity” Strand 5: Genetics, Evolution and Biodiversity, Grade 9-10 Curriculum Embedded Tasks. Conn. Dept. of Edu.
<http://www.sde.ct.gov/sde/cwp/view.asp?a=2618&q=320890> , 8/10/2009.
- Lecture Notes/PowerPoint Presentations.

Embedded Technology and Web Resources

- Human Population Project (See above) utilizes PowerPoint and Internet searches for student project.

Embedded Literacy

- Collection of articles regarding population trends.
<http://www.globalissues.org/issue/198/human-population>
- On population explosion and other future trends in human population.
http://www.eoearth.org/article/Human_population_explosion?topic=54245
- Natural Geographic website covers an array of topics including human population trends.
<http://news.nationalgeographic.com/news/>
- Article on USA population trends and some links to other sites involved in studying overpopulation. <http://www.impactpress.com/articles/febmar99/population2399.html>
- Other resources can be found at:

Connecting News with National Science Standards

<http://expertvoices.nsdl.org/connectingnews/>

The New York Times Daily Lesson Plans

<http://query.nytimes.com/gst/learning.html>

Calibrated Peer Review (reading and writing-free and online)

<http://cpr.molsci.ucla.edu/>

Science News Online

<http://www.sciencenews.org/>

* Core Scientific Literacy, Inquiry and Numeracy are key themes that should be embedded through-out the course, units and activities.

Common Misconceptions:

- Populations:

“Evolution is a theory about the origin of life.”^{1,3}

“Organisms are always getting ‘better’”.¹

“Evolution happens by ‘chance’”.¹

“Organisms are ‘trying’ to change”.¹

“Natural selection gives organisms what the “need””.

“Evolution is just [another] theory”, and “It is in crisis (not observable, gaps in support, other theories valid scientifically)”.¹

“Individuals can adapt to changes in the environment”, “Acquired traits are in heritable”.²

- Sources:

http://evolution.berkeley.edu/evolibrary/misconceptions_faq.php

Berthelsen, B (1999) Students Naïve Conceptions in Life Science. MSTJ Journal 44 (1) pp. 13-19. www.msta-mich.org.

Keeley, P and J. Tugel (2009) Uncovering Student Ideas in Science vol 4. NSTA Press, Arlington.

UNIT 8 – Simple Organisms

Part 1 – Simple Organisms (Unit 8– Enrichment)			
Grade: 10	Subject: Biology - Science	Course: Honors and General Biology 1	Length of Unit: If Time - Variable

Big Idea (BI) and Essential Questions (EQ)
<ul style="list-style-type: none"> • BI - Simple organisms have basic diagnostic characteristics and specific roles in the ecosystem. • EQ - What processes are responsible for life’s unity and diversity?

Part 2 – Standards					
Standards for this unit	Key (GLE) Content Knowledge and Concepts/Skills				
	<table border="1"> <tr> <td>The students will know:</td> <td>The students will be able to:</td> </tr> <tr> <td> <ol style="list-style-type: none"> 1. Distinguish between Eubacteria and the Archaeobacteria. 2. Koch’s postulate. </td> <td> <ol style="list-style-type: none"> 1. Compare and contrast the general categories of bacteria. 2. Describe the lytic and lysogenic cycles of viruses. </td> </tr> </table>	The students will know:	The students will be able to:	<ol style="list-style-type: none"> 1. Distinguish between Eubacteria and the Archaeobacteria. 2. Koch’s postulate. 	<ol style="list-style-type: none"> 1. Compare and contrast the general categories of bacteria. 2. Describe the lytic and lysogenic cycles of viruses.
The students will know:	The students will be able to:				
<ol style="list-style-type: none"> 1. Distinguish between Eubacteria and the Archaeobacteria. 2. Koch’s postulate. 	<ol style="list-style-type: none"> 1. Compare and contrast the general categories of bacteria. 2. Describe the lytic and lysogenic cycles of viruses. 				

	<ol style="list-style-type: none"> 3. Viruses are obligate internal parasites. 4. Classify viruses by genetic component and way of infections. 5. Protists can be plant-like, fungi-like or animal-like. 6. Fungi are classified by their structures and methods of reproduction. 	<ol style="list-style-type: none"> 3. Describe the methods of controlling bacterial and viral proliferation. 4. Compare and contrast different protists and contrast them to prokaryotes. 5. Describe the ecological importance of the protists. 6. Compare and contrast the structures of all simple organisms according to their structures and methods of reproduction.
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Part 3 – Common Unit Assessments

No Current pre- or post-test(s) exists for Biology 1. This unit is an overlap with another course (Biology 2), and is presented here as an “If Time Allows”, enrichment unit.

Part 4 – Common/Assured Learning Experiences

1.) Activities that explore mechanisms of controlling bacteria growth.

“Controlling Bacterial Growth” (1995) Laboratory Manual: Biology Prentice Hall, Pages 219 – 224.

2.) Activities that explore the diversity and physical characteristics of bacteria, protists and fungi. (optional examples below)

“Identifying Bacteria” (1995) Laboratory Manual: Biology Prentice Hall, Pages 213 - 218.

Part 5 – Teacher Notes

General Notes

Unit 8-Simple Organisms will be an overlap with Biology 2 (all Levels).

- Assigned Readings from **Class Textbook**: Chapters 19, 20 and 21.
- Lecture Notes/PowerPoint Presentations.

Embedded Technology and Web Resources

- Human Population Project (See above) utilizes PowerPoint and Internet searches for student project.

Embedded Literacy

- Collection of articles on simple organisms including microbes.
<http://esciencenews.com/topics/biology.nature>
- Other resources can be found at:

Connecting News with National Science Standards

<http://expertvoices.nsd.org/connectingnews/>

The New York Times Daily Lesson Plan

<http://query.nytimes.com/gst/learning.html>

Calibrated Peer Review (reading and writing-free and online)

<http://cpr.molsci.ucla.edu/>

Teacher resource.

<http://www.teachersdomain.org/resource/tdc02.sci.life.stru.singlecell/>

General Resource for articles for students and teachers in multiple disciplines.

<http://www.physorg.com/biology-news/microbiology/>

Online resource discussing single celled organisms.

http://www.docstoc.com/docs/6051513/Single-celled_organism

Science News Online

<http://www.sciencenews.org/>

* Core Scientific Literacy, Inquiry and Numeracy are key themes that should be embedded throughout the course, units and activities.

Common Misconceptions: **Not researched for this current document.**

- Viruses:
- Moneran (Bacteria):
- Fungi:
- Sources:

Midterm and Final Exam

Midterm – After completion of units 1-3 (About mid-January in year), students should complete a mid-term examination.

Honors Midterm: [Midterm Honors Biology 2010](#)

General Midterm: [College Bio 1 Midterm 2010-2011](#)

Final Exam - After completion of units 4-6 (About June, before end of school), students should complete a final examination. Unit 8 and the required population activity (Unit 7) are not included in either exam.

Honors Final: [Final Exam Honors](#)

General Final: [Biology I final Spring 11](#)