

**EPPING HIGH SCHOOL
COURSE SYLLABUS EXEMPLAR**

Course Title:	Biology
Course Description (Program of Studies)	This course focuses on an in-depth study of cellular processes, genetics, evolution and the scientific method. It covers classification of organisms, ecology and an extensive look into each of the Kingdoms of Life. Themes and concepts are integrated throughout the course. There is a strong focus on laboratory procedure and safety.
District Competencies for Learning (DCL)	<p>Students will understand concepts and demonstrate ability to transfer skills across content areas and apply concepts and skills to real-life situation.</p> <p>Nature of Science – Students will understand that science plays a significant role in our culture and everyday lives and demonstrate the ability to actively engage in scientific investigation.</p> <p>Constancy & Change – Students will understand that living things, materials, and systems remain constant, change at different rates, or exist in equilibrium over time.</p> <p>Systems & Energy – Students will understand that there is order and predictability in the universe which can be organized into systems and energy.</p> <p>Form & Function – Students will understand that the form or shape of a living thing, material, or system is related to its function.</p> <p>Models & Explanations – Students will understand that scientists use logic, models, evidence, and current knowledge to explain their world.</p>
District Skills Competencies for Learning (DSCL)	<p>Students will become a:</p> <p>Collaborator – Students will understand that respect, collaboration, and leadership are critical to interacting and working effectively with others.</p> <p>Communicator – Students will demonstrate the ability to communicate clearly using the most appropriate and effective means.</p> <p>Contributor – Students will demonstrate the ability to contribute toward a better world through community service, acceptance and tolerance of diverse people, and responsibility for the environment.</p> <p>Evaluator – Students will demonstrate the ability to access, evaluate, use, and manage information.</p> <p>Learner – Students will demonstrate the ability to be flexible, adaptable, and accountable throughout the learning process.</p> <p>Producer – Students will demonstrate the ability to manage projects, produce results, and create media products.</p> <p>Technology User – Students will demonstrate the ability to use technology respectfully and apply it effectively.</p> <p>Thinker – Students will demonstrate the ability to think critically, creatively, and systemically to define and solve problems.</p>

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	in and across content areas.
School Based Course Competency Statements (CCS linked to DCL)	<ol style="list-style-type: none"> 1. Students will understand that scientific investigations are carried out under the guidelines of the scientific method through the safe and proper use of the tools and technology of the trade. (Nature of Science, Models & Explanations) 2. Students will understand that the cell is the basic unit of life for all living things and it is at the cellular level where organisms meet all the necessary requirements to sustain life. (Form & Function, Systems & Energy) 3. Students will understand that DNA that is handed down through populations determines the genetic structure of all individuals and that differences in the DNA patterns are responsible for genetic diversity. (Constancy & Change, Systems & Energy) 4. Students will understand that organisms are classified into a system of kingdoms according to their degree of evolutionary relatedness. (Constancy & Change, Form & Function) 5. Students will understand that species evolve over time through the process of natural selection based on genetic variation and environmental factors. (Constancy & Change, Models & Explanations) 6. Students will understand that ecosystems are made up of interrelated populations and that the actions of the individuals within any species can have an impact on the survival of the entire ecosystem. (Form & Function, Systems & Energy) 7. Students will understand that matter and energy flow through and between ecosystems following patterns that include both living and non-living factors. (Systems & Energy, Form & Function) 8. Students will understand that scientific knowledge is the result of the cumulative efforts of people, past and present, who have attempted to understand the natural world, and that this knowledge is continually revised as new information is obtained. (Nature of Science, Models & Explanations)
Units of Study	<ol style="list-style-type: none"> 1. The Nature of Science 2. Themes of Life /The Living Cell 3. Genetics 4. Classification and Evolution 5. Ecology 6. Organization of Life
Course Unit Content and Skills	<p>The Nature of Science (CCS1) (DCL Nature of Science, Models & Explanations)</p> <ol style="list-style-type: none"> 1. Students will apply the principles of the scientific method during investigations. 2. Students will demonstrate safe techniques in the lab and conduct myself properly as a lab student. 3. Students will demonstrate the scientific process by asking relevant questions,

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conducting careful investigations, and evaluating the validity of results.

4. Students will utilize the technology and instruments used in scientific exploration.

Themes of Life/The Living Cell (CCS2) (DCL Form & Function, Systems & Energy)

1. Students will collect field samples and identify the components necessary for life.

2. Students will explain the history of the cell theory and the contributions of the scientists that led to our understanding that cells are the basic structural and functional units of life.

3. Students will create and utilize physical and virtual cellular models.

4. Students will describe the roles of the organelles and summarize the events of cellular process such as protein synthesis and membrane transport.

5. Students will predict the outcomes of experimentation with membrane transport.

6. Students will compare and contrast passive and active membrane transport.

7. Students will describe the limitations of cell growth and the process of cell cycle.

8. Students will differentiate between mitosis and meiosis and describe the pros and cons of each type of reproduction.

9. Students will identify the levels of biological organization and the four types of body tissues.

Genetics (CCS3) (DCL Constancy & Change, Systems & Energy)

1. Students will model the structure of DNA and how proteins are made to determine the structure and function of cells.

2. Students will explain that offspring receive DNA from parents.

3. Students will explain why chromosomal mutation will lead to genetic variation and how mutations can have positive, negative or no influence on the organism.

4. Students will describe how humans are similar to other species in many ways and yet are unique among earth's life forms.

5. Students will predict the changes of the occurrence of traits with the use of Punnett squares and the laws of probability.

6. Students will distinguish between dominant, recessive, genotype, phenotype and Nonmendelian genetics when referring to genes.

7. Students will explain that the growth of scientific knowledge in Life Science has been advanced through the development of technology and is used to identify, understand, and solve local and global issues.

8. Students will replicate a DNA segment and transcribe the segment into its complementary RNA strand.

9. Students will utilize the amino acid chart to construct a protein.

Classification and Evolution (CCS 4 & 5) (DCL Constancy & Change, Form & Function, Models & Explanations)

1. Students will explain how evolution and natural selection will result in organisms changing over time using examples in nature.

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2. Students will utilize modern classification systems to group organisms by degree of relatedness and understand why it is necessary for the scientific community to use a uniform system.
3. Students will explain that humans are similar to other species in many ways and yet are unique among Earth's life forms.
4. Students will predict how the effects of natural selection can influence an entire ecosystem, not just a species.
5. Students will explain that evolution is not predetermined because of the mutual influence of the environment and the genetics of development.
6. Students will compare the contributions of prominent contributors to the theory of evolution.

Ecology (CCS 6 & 7) (DCL Form & Function, Systems & Energy)

1. Students will explain how organisms are dependent on one another and their environment.
2. Students will differentiate between the levels of ecological organization from individual to biosphere.
3. Students will model how matter and energy cycle through organisms and their environment using the water cycle and biogeochemical cycles.
4. Students will explain that ATP is a universal form of energy for life.
5. Students will explain how energy used to keep cells functioning flows from its origins in the sun and chemicals through various levels of consumers.
6. Students will explain that matter and energy exist in multiple forms in all living and nonliving systems, and can cycle through these systems following similar patterns.
7. Students will identify abiotic and biotic factors that can influence the development of a species within an ecosystem.
8. Students will identify and explain current issues of human impact on the biosphere and methods developed to address these issues.
9. Students will create a model of one of the world's major biomes.

Organization of Life (CCS 8) (DCL Nature of Science, Models & Explanations)

1. Students will collect and properly identify field samples.
2. Students will compare how members of each kingdom obtain the components necessary for life.
3. Students will research and identify pathogens and explain their impact on living organisms worldwide.
4. Students will explain why viruses are not considered to be alive.
5. Students will predict how unidentified organisms might be placed into specific kingdoms based on their characteristics.
6. Students will describe the process of photosynthesis and explain why it is the

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	<p>reverse of cellular respiration.</p> <p>7. Students will identify the different types of plants based on their physical structures and how they reproduce.</p> <p>8. Students will model how plants utilize a system of alternation of generations.</p> <p>9. Students will define all the systems necessary for an animal to survive.</p>
Instructional Strategies	This course has a strong focus on laboratory procedure and safety. Instructional strategies include individual and group learning through lecture, discussions, demonstrations, research and investigation.
Assessment Strategies	Assessment strategies include homework, quizzes, journal entries, unit tests, labs, projects, midterms, and finals. Assessment design includes District Competencies for Learning and Course Competencies.
Approved	June 2011
Revised	<ol style="list-style-type: none"> 1. Links course competencies to district competencies for content 2. Still need to link course competencies to district competencies for skills

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