**Biology 2014-2015**

**Course Description**: This course encourages you to think critically and is designed to provide students with an understanding of Evidence of Natural Selection, Classification and Ecology, Cellular Transport, Biochemistry, Metabolism, Genetics and DNA/RNA /Protein Synthesis, and Disease. Students will be assessed based on 5 different skills: Using the scientific process, developing and using models, Using mathematic and computational thinking, Constructing explanations and designing solutions, and Engaging in argument from evidence.

**Course Competencies:**

By the end of this course:

1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
6. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
7. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
8. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem
9. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
10. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.\*
11. Evaluate the evidence for the role of group behavior on individual and species’ chances to survive and reproduce.
12. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.\*
13. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
14. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
15. Construct and revise an explanation based on evidence for how different molecules of life contain different amounts of energy.
16. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
17. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
18. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
19. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
20. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
21. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
22. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
23. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
24. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

**Standards**: Next Generation Science Standards: [www.nextgenscience.org](http://www.nextgenscience.org)

**Grading Practices**:

Students will be graded on their ability to demonstrate what they know and are able to do based upon the five skills: Using the scientific process, Developing and using models, Using mathematic and computational thinking, Constructing explanations and designing solutions, and Engaging in argument from evidence.

**Timeline/Scope and Sequence**: (this is subject to change)

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| --- | --- | --- |
|  | TOPICS | Summative Assessments |
| Quarter One | * Lab Safety * Natural Selection/Evolution * Ecology (Begin) | * Lab Safety Test * Evolution Lab Analysis * Inner Fish Analysis * Cladogram Analysis |
| Quarter Two | * Ecology (Finish) * Cell Transport * Biochemistry (Start) | * Environmental Impact Project * Egg Lab Analysis * Dialysis Tubing Lab Analysis * Unit Test |
| Quarter Three | * Biochemistry (Finish) * Metabolism * Cell Reproduction | * Formal Lab Report * Models Test * Unit Test * Genetic Disease Project |
| Quarter Four | * Genetics * DNA/RNA/Protein Synthesis | * Punnett Squares * Pedigree Charts * DNA/RNA/Protein Synthesis Project |

**Text**

Postlethwait, John H.; and Janet L. Hopson. Modern Biology. Holt, Reinhart and Winston, New York, New York: 2006.

* This will be available either as a book or CD.

I have read the syllabus and classroom expectations for Biology.

Student Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_

Student Name (print)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent/Guardian Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_

Parent/Guardian name (print)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Best contact for parent/guardian: Time of Day:

Phone:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; email:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Field Trip Permission**

Throughout this course we may be taking some trips off campus to places such as Fox Forest or the river. This is a generic permission slip to grant your students permission to travel off campus with his or her Biology class. By signing this you are agreeing that your student may participate in these short trips. Any more substantial trips will have a slip sent home prior to the trip.

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Student Name Parent Signature

**Movie Permission**

Throughout this course we may be viewing PG-13 or R videos that pertain to the curriculum. This is a generic permission slip to grant your student permission to watch videos during his or her Biology class.

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Student Name Parent Signature