Curriculum Sample Template
Max. 8 Pages

Grade Level	10th Grade	**Content Area**	Biology
Course Title (grades 9-12 Only)	Biology		
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	• Students understand how to work in precision partnerships effectively. • Understand the relationship of DNA, chromosomes, and genes as the molecular basis of heredity • Understand the process of mitosis and meiosis as it relates to genetic variations • Understand the molecular basis of genetics, phenotype and genotype • Collaborate in cooperative pairs • Ability to use class laptops responsibly and effectively • Ability to use the Cornell Note template		
Alignment to Program of Instruction *Briefly outline methods of instruction found in this sequence of lessons that align to the Program of Instruction described in A.3.*	This unit is built on the framework of the SIOP Model and incorporates all 8 of the SIOP Model components. Sentence framing and precision partnering are instructional strategies which promote the use and mastery of academic language. Instructional technology is incorporated by teacher and students. The core curriculum is implemented with fidelity.		
Standard Number and Description *List the Number* and the full description for the Required Standard or Science Performance Objective listed in section A.6.*	**HS.4.4.3** Describe how the continuing operation of a natural selection underlies a population's ability to adapt to changes in the environment and leads to biodiversity and the origin of new species. **Common core LA: 10.WHST.2** Write an informative/explanatory text that introduces a topic, develops facts and ideas, provides transitional words or phrases, uses domain-specific vocabulary, utilizes a formal style, and ends with a concluding statement. **Common core LA: 10.RST.2** Determine central ideas and conclusions of texts		
Materials/Resources Needed	• permission slips, Oxford Journal article, laptops for scienceprimer site, phenotype/genotype quiz, case studies, BBC video stream, Scientific American article, Day 1 answers, notebooks, field trip sign in, emergency contact numbers, yesterday's fieldtrip notes, article, highlighters, adaptation quiz, Day 4 quizzes, Adaptation Quiz #2, 5 paragraph rubrics, coping and mastery model copies/scans, jigsaw reading copies, human adaptation graphic organizers, presentation rubrics		

* ***Standard Number****: For English Language Arts (Reading and Writing), use Grade, Strand, Standard (e.g., 3.RI.2). For K-8 Math, use Grade, Domain, Standard (e.g., 6.EE.7). For HS Math, use Conceptual Category-Domain, Standard (e.g., A-REI.6). For Science, use Grade, Strand, Concept, PO (e.g., 4.1.3.1).*

	teacher instruction	student activities
Day 1	• BELL RINGER: Offer 4 case studies from the Oxford Journal to provide a real-world context for the upcoming unit: http://rcgp-innovait.oxfordjournals.org/content/1/8/589.full • Facilitate case study discussion • Explain how this is a frame for delving into genotype/phenotype specifics • Present power point of genotype and phenotype • Facilitate natural selection lab • TICKET OUT: Proctor phenotype/genotype quiz	• BELL RINGER: Read 4 case studies about genetics from the Oxford Journal. • Participate in an ethics discussion about each case study • Complete Cornell Notes for genotype and phenotype presentation • In pairs, students will use laptops to research biodiversity of finches on the Galapagos islands. They will determine what traits would be environmentally selected for through the process of natural selection in a given niche of the Galapagos. Using a coin, they will flip to determine if each trait is dominant, mixed, or recessive. Using a Punnett square calculator on their laptops http://www.scienceprimer.com/punnett-square-calculator, they will determine the genotype and phenotype of their finch. Students will then explain how their phenotype is suited for the environmental niche. In addition to the lab write-up, students need to draw the beak of their finch and explain what type of food would be the staple of their diet. • TICKET OUT: Natural selection niche quiz • PERMISSION SLIPS: send permission slips home for this week's field trip
Day 2	• BELL RINGER: Review answers from Day 1 bell ringer • Stream Ghost in Our Genes from BBC: http://www.documentary24.com/the-gost-in-our-genes-science-of-genetics--173/ • Redistribute Punnett squares from Day 1 lab to pairs and have them discuss how epigenetics could impact the offspring drawing • Read article about gene therapy from Scientific American: http://www.scientificamerican.com/article.cfm?id=experts-gene-therapy • TICKET OUT: Give 1 pager prompt: write a personal	• COLLECT PERMISSION SLIPS and GIVE REMINDERS! • BELL RINGER: Read 4 case studies about genetics from the Oxford Journal. • Complete Cornell Notes for documentary • Consider epigenetic implications for their offspring designed as part of the Day 1 lab activity • Complete Scientific American biodiversity population change and explain how the natural selection from the lab activity relates to population change through environmental pressure. • TICKET OUT: Write a personal reflection about how environmental elements can impact genetics in an

	response to the day's information that explores how genes are impacted by the environment	individual and reach into future generations • PERMISSION SLIPS: send permission slips home for this week's field trip
Day 3	• BELL RINGER: Screen Popsci "10 Amazing Cases of Modern Evolution and Adaptations" http://www.popsci.com/science/article/2011-09/ten-new-or-newly-discovered-animal-evolutions-including-humans • Ask for a prediction: what adaptations would be most advantageous for a plant living in the desert? Make a class list on the SMART Board • Desert plan adaptation field trip to Phoenix Desert Botanical Garden • Encyclopedia of Earth "Adaptations of Desert Plants" http://www.eoearth.org/article/Adaptations_of_desert_plants?topic=74361 • TICKET OUT: Collect field trip notes	• COLLECT PERMISSION SLIPS • BELL RINGER: For each Popsci example, identify the specific adaptation for each case study and explain how that change could make the organism more successful and how the fitness of the successful organisms would change the population over time • Participate in a prediction conversation and contribute ideas to the desert adaptation, biodiversity, and origination of new species conversation • Take tour of Phoenix Desert Botanical Garden. Take notes on adaptations and niches viewed and discussed by class guide • TICKET OUT: Submit field trip notes
Day 4	• BELL RINGER: Distribute field trip notes back to students. Have Day 3 desert adaptation predictions on the SMART Board. Add unpredicted adaptations. Have students explain why each is advantageous • Distribute Encyclopedia of Earth's "Adaptations of Desert Plants" http://www.eoearth.org/article/Adaptations_of_desert_plants?topic=74361 and lead discussion about additional adaptations and their advantages. • Give essay assignment: Write an informative, 5 paragraph essay that describes key desert plant adaptations, explains their genotypic or phenotypic cause, offers the evolutionary advantage each adaptation provides, and illustrates how these advantages cause changes in populations over time. • TICKET OUT: Give adaptation quiz	• BELL RINGER: Collect field trip notes. Identify predictions that were viewed at yesterday's field trip and add unanticipated adaptations. For each, explain how the adaptation is advantageous for the plant. Ask students to infer how these adaptations would cause changes for the specific plant over time. • Check items in article that were seen yesterday. Highlight items that present new information. • Write 5 paragraph essay. Drafts that are not complete should be taken home as homework and returned tomorrow. • TICKET OUT: Take adaptation quiz
Day 5	• BELL RINGER: Review Day 4 quiz results. Review class data and explain correct answers vs. distractors • Provide 5 paragraph essay rubric • Project coping and mastery models of a five paragraph	• BELL RINGER: Review Day 4 quiz results and have students write an explanation for each item missed. • Review 5 paragraph essay rubric • View coping and mastery models

	essay from last term's class. Highlight examples of rubric elements to help students envision a mastery final product. • Direct students to use the rubric to identify their own editing 'to do' list. • Direct students to have a short teacher writing conference on all edited materials BEFORE moving forward with final copy. • TICKET OUT: Adaptation Quiz #2	• Edit own draft • Have a quick writing conference with teacher when draft is complete • Begin rewriting final draft • TICKET OUT: Adaptation Quiz #2
Day 6	• BELL RINGER: Give quick write prompt: What are the biggest biological obstacles to human survival? What adaptations could evolve that would fight each threat? • Facilitate <u>JIGSAW READINGS:</u> • "Evolutionary Adaptation in the Human Lineage" article by Nature Education http://www.nature.com/scitable/topicpage/evolutionary-adaptation-in-the-human-lineage-12397 • Desert plan adaptation field trip to Phoenix desert botanical garden: Encyclopedia of Earth "Adaptations of Desert Plants" http://www.eoearth.org/article/Adaptations_of_desert_plants?topic=74361 • NY Times "Drug Resistance Explained" http://well.blogs.nytimes.com/2008/03/27/drug-resistance-explained/ • Huffington Post "Is Mild ADHD a Favorable Evolutionary Adaptation to Technology?" http://www.huffingtonpost.com/russell-shaw/is-mild-adhd-a-favorable-_b_61924.html • NYTimes "Depression's Upside" http://www.nytimes.com/2010/02/28/magazine/28depression-t.html?pagewanted=all • USC "Human Genetic Adaptation Leads to Longer Lives, More Cancer and Heart Disease" http://www.newswise.com/articles/human-genetic-adaption-leads-to-longer-lives-more-cancer-and-heart-	• BELL RINGER: Generate a list of the biggest obstacles to human survival, environmental adaptation, and population shifts . . .then brainstorm adaptations that could fight each threat. • Read one assigned jigsaw article • In a cooperative group, prepare a short presentation for the class about their assigned human adaptation(s) • Take notes when not presenting that document the central ideas of each article/topic on the 3 column human adaptation graphic organizer (adaptation, benefit, liability) • Give presentation with group • TICKET OUT: graphic org and final draft of essay with self-assessment rubric and reflection

	disease • NPR "Un-natural Selection: Human Evolution's Next Steps" http://www.npr.org/templates/story/story.php?storyId=129638953 • Distribute human adaptation graphic organizer and direct students to use it for presentation note taking • Facilitate presentations and complete rubrics for each • TICKET OUT: graphic org	
Day 7	• BELL RINGER: Distribute graphic organizers from yesterday • Proctor Unit Test for Adaptation and Evolution • TICKET OUT: Unit reflection and Cornell Note summary guidance	• BELL RINGER: Review graphic organizer from yesterday • Take Unit Test for Adaptation and Evolution • TICKET OUT: Complete unit reflection and Cornell Note unit summary

Adaptation and Evolution Test Answer Key

1. C 2. A 3. A 4. B 5. B 6. B 7. C 8. B 9. A 10. Answer would contain description that peppered moths were environmentally selected due to the amount of pollution present. Once the second change has taken place, the population would shift back in favor of the original color of the moth.

Analysis Scoring Guide:

Raw rubric points available: **10 points total; each item is worth 1 point**

Raw score_____X 10 = Final Score out of 100 points

The 100 points possible assessment will reflect the school's grading scale:

90 -100 = A – Mastery

80 – 89 = B - Mastery

70 – 79 = C – Needs Screening for Remediation

60 – 69 = D – Needs Remediation

0 – 59 = F – Needs Intensive Remediation

Adaptation and Evolution Test

1. Phenotype is the _____ of the organism and is dependent on the _____ make-up of the traits passed down from the P generation.
   A. genotype, phenotypic
   B. homozygous, genotypic
   C. appearance, genotypic
   D. codominance, phenotypic

2. Gametes (sex cells) are described as_____ and carry the _____ information for the offspring.
   A. haploid, genotypic
   B. diploid, genotypic
   C. triploid, phenotypic
   D. adult cells, phenotypic

3. In rabbits, brown hair is dominant over white hair. A heterozygous mother and a homozygous recessive father have a baby. What are the expected phenotypes and genotypes and in what percentages?
   A. The rabbit would have a genotypic likelihood of 50% Bb and 50% bb and would have a 50% chance of having brown hair.
   B. The rabbit would have a genotypic likelihood of 100% Bb and would have a 100% chance of having white hair.
   C. The rabbit would have a genotypic likelihood of 25% bb and would have a 75% chance of having brown hair.
   D. The rabbit would have a genotypic likelihood of 50% BB and would have a 50% chance of having brown hair.

4. If the offspring listed above lived in an environment that favored rabbits with brown hair (e.g. dessert), which of the following statements about natural selection through environmental pressure would be true?
   A. All offspring would likely survive at the same rate regardless of genotype.
   B. Offspring with the Genotype Bb would display a phenotype that would help them survive.
   C. Offspring with the Genotype bb would display a phenotype that would help them survive.
   D. Genotype does not affect phenotype for these offspring and all rabbits would be likely to survive.

5. The long-term effects of the environmental pressure described above would most likely lead to what changes in the population:
   A. an increase in the genotype bb
   B. an increase in the genotypes BB or Bb
   C. an increase in the phenotype for white hair
   D. no change in genotype or phenotype

6. Which genetic adaptation would most likely be passed on to future generations of humans?

A. an enhanced sense of smell
B. an immunity to cancer
C. the ability to fly
D. the elimination of the appendix

7. An environmental niche increases biodiversity by…
   A. Increasing the number of species who are able to survive on the same type of food
   B. Decreasing the number of animals who are able to adapt to their environment
   C. Creating habitats that allow species to adapt and live on the specific resources available
   D. Decreasing the number of predators that can feed on all available species

8. Wildflowers in the dessert grow to be several different heights on the side of a given hill. Over many generations, these flowers have decreased in height. Today, all flowers are a similar, short height. This is an example of which type of selection?
   A. Disruptive selection
   B. Stabilizing selection
   C. Directional selection
   D. Sexual selection

9. What happens to the allelic frequency when selection occurs?
   A. They increase
   B. They decrease
   C. They remain the same
   D. They become even for all alleles

10. During the industrial revolution, many parts of the United States experienced a dramatic increase in the amount of visible pollution. During this time, there was an increase in the number of peppered moths (moths who were shaded with black spots). Explain how the environmental change influenced the population and describe what would take place with the population of moths if the environment was suddenly restored to pristine conditions.

Writing Prompt for Environmental Selection of a Population

Write an informative, 5 paragraph essay that describes key desert plant adaptations, explains their genotypic or phenotypic cause, environmental adaptation, and offers the evolutionary/natural selection advantage each adaptation provides.

Rubric for Environmental Selection of a Population

Expository Essay Rubric

Essay: (34 points)

Quality Introduction Is Offered 1 2 3 4 5

1=is non-existent or unclear; 2=is bland and vague; 3=is average and clear ; 4=is specific and interesting; 5=is specific, attention-grabbing, and creative

Develop Topic with Well-Chosen, Relevant, Sufficient Facts 1 2 3 4 5

1=topic is underdeveloped by poorly-chosen, irrelevant, or limited facts; 2=topic is somewhat developed by limited facts that are mostly relevant and consciously selected; 3=topic is fully developed by well-chosen, relevant facts sufficient in number; 4=topic is masterfully developed by carefully selected, relevant, details in rich number

Concluding Statement Follows from Essay 1 2 3

1=conclusion is limited and disjoined from essay; 2=conclusion is adequate and flows from essay 3=conclusion is good and flows cleanly from essay

Use of Transitional Words to Create Cohesion and Clarify 1 2 3 4 5

1=1 used; 2=2 used; 3= 3 used; 4=4 used; 5=5 used

Language employed is academic, powerful, and domain-specific 1 2 3 4 5

1=language is vague and pedestrian; 2=language lacks specificity and is not consistently academic; 3=language is specific and academic; 4=language is quite specific, powerful, and very academic, but at times loses control of the content and/or focus; 5=language is quite specific, powerful, and academic without losing control of the content

Language employed is varied 1 2 3 4 5

1=language is overly-repetitive; 2=language chosen contains considerable repetition in adverbs, verbs, and adjectives; 3=language is not repetitive for most adverbs, verbs, and adjectives; 4=language is varied and offers a spectrum of word choice, but at times lacks a mastery of connotation; 5=language is quite varied and never lacks mastery of connotation

Formality of Voice and Objective Tone 1 2

1 =mostly informal and subjective; 2=mostly formal and objective

Conventional Control 1 2 3 4

1=grammar/spelling/punctuation contain errors to distraction; 2= grammar/spelling/punctuation contain several errors; 3= grammar/spelling/punctuation contain no errors; 4= grammar/spelling/punctuation contain no errors and reach to incorporate advanced usage (parallel structure, semi-colons, colons, dashes) when useful

Comments/Notes: **Score: _____/34 points = _____/100% = _____/100 points**