Teacher's Name(s): Fatimah & Corinne
Subject/Course: Biology
Date: 6/30/17

Unit: Genetics/Evolution
Lesson 1: Complex Patterns of Heredity

Essential Questions from CB Course of Study:

- What are the factor that influence patterns of heredity?
- How does mutations cause genetic disorders?
- How are SNPs used in a GWAS?
- How do GWAS allow researchers to find genes that cause disease?

Academic Standards:

- BIO.B.2.3 Explain how genetic information is expressed
    - BIO.B.2.3.1 Describe how genetic mutations alter the DNA sequences and may or may not affect phenotype (e.g., silent, nonsense, frame-shift).

Objectives/Learning Targets:

- Identify the factors that influence patterns of heredity.
- Describe how mutations can cause genetic disorders.
- Compare DNA sequences of many individuals reveals common variation across the genome.
- Variations associated with a trait can point to the location of the gene (or genes) responsible for that trait.
- Given sample data (amino acid differences in proteins from individuals in different groups), students will build a matrix of differences.
- From the matrix of differences, students will construct a reasonably parsimonious cladogram of groups, and correctly answer questions regarding inferred evolutionary relationships based on the cladistic analysis.
- DNA sequences that are more similar are believed to share a more recent common ancestor than DNA sequences that show more differences.

Differentiation:
Flexible Grouping
Individual v Group Work
Pick your Station
Peer to Peer Instruction
Scaffolded Instruction based on pretest results
Different Pacing for Assignment completion
Read and write learners write a book report.
Visual learners create a graphic organizer of the story.
Auditory learners give an oral report.
Kinesthetic learners build a diorama illustrating the story.

Checking for Understanding:
What are genes? (part 5 in packet two questions)

Homework/Academic Practice:
Day 1: Before class homework - Read and answer questions (part 1 in packet)
Watch 30 min video -
http://www.hhmi.org/biointeractive/dog-genomics-and-dogs-model-organisms

Day 2: Before class homework - Do codecademy (python)
https://www.codecademy.com/

Materials:
Student lesson packet
Teacher resource packet
SNPs card
Computers
Projectors

Knowledge Taxonomy:
Gene
Phenotype
Genotype
Genome
Single Nucleotide Polymorphisms (SNP)
Evolution
Cladogram
Mutation
Sequencing
DNA
Biotechnology
Genetics
Nucleotide
Base Pair
Genome-wide association study (GWAS)

Instructional Procedures:
Anticipatory Set (Total 10 minutes)
Based your answers to the following question on the reading from the homework assignment

1. Why do you think it is important to analyze the DNA of many dogs when doing this research?
2. What are SNPs?
3. Do humans have SNPs?
4. How might the dog genome project benefit humans?

Instructional Input (Total 35 minutes)
Introducing New Learning (Total 15 minutes)
Part 1: Introducing GWAS (part 2 in packet)

Student Practice (Total 20 minutes)
Identify Associations Using Real Data (part 3 in packet)

Checking for Understanding (Ongoing)
Pretest
KWL Charts
5 hardest questions
Open Ended Questioning
Individual conferences- individualized feedback
Formal Assessments- quizzes, unit test
Lab

Closure (Total 5 minutes)
What are the genes? (part 5 in packet)

Lesson Reflection

In this lesson, I ……

Stated my learning targets in clear, student friendly language
Actively engaged students
Checked for understanding
Kept the pace of the lesson, completed in the time allotted, and provided student-centered closure