**Native American Community Academy UbD 4.0**

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| **Stage 1 Desired Results** *What are your unit objectives and outcomes?* | | |
| BIG IDEAS  Genetics is the study of DNA and the transfer of information from one generation to the next, from the way we look to our medical predisposition, genetics touches our everyday lives. | ***Transfer*** | |
| *Students will be able to independently use their learning to…*   1. *Compare mitosis and meiosis* 2. *Model the phases of meiosis*   *use monohybrid and dihybrid crosses to predict the genotypes and phenotypes of  offspring*   1. *Use probability to predict the results of genetic crosses* 2. *Use pedigrees to study and predict the inheritance of traits within families )* 3. *Model DNA replication* 4. *Model transcription and translation* 5. *Transcribe and translate a gene into the amino acid sequence of a protein*   *8. Predict changes in amino acid sequence (changes in the structure of a protein)*  *Based on the DNA mutation.* | |
| ***Meaning*** | |
| UNDERSTANDINGS  *Students will understand that….*   * *Genes are passed from one generation to the next.* * *Genetic makeup determines their physical characteristics/traits.* * *DNA serves as the blueprint for the production of all the proteins that cells require to function.* * *DNA mutations result in faulty proteins (or no proteins) that prevent normal function…* * *Meiosis is only done with sexual reproduction.* * *Meiosis produces a diverse offspring.* | ESSENTIAL QUESTIONS   * Why am I alike, yet different, than my parents? * Would I want to know my genetic make-up? * How do genes determine who we are? * What is the difference between mitosis and meiosis |
| ***Acquisition*** | |
| *As a result of this unit, students will know…*  • Lesson 1: The stages of meiosis  • Lesson 2: The difference between diploid and haploid cells  • Lesson 3: That crossing over occurs during meiosis and results in new combinations of genes on a chromosome  • Lesson 4: The structure of a chromosome  • Lesson 5: How to interpret a karyotype including identifying autosomal and sex chromosomes  • Lesson 6: The basic principles of Mendelian genetics  -principle of dominance  -segregation  -independent assortment  • Lesson 7: How the law of independent assortment and segregation relate to meiosis and result in genetic variability  • Lesson 8: That genotype results in phenotype  • Lesson 8: That some traits are sex-linked  • Lesson 9: That some traits do not follow basic Mendelian Genetics | *As a result of this unit, students will be able to…*  *Lesson 1: Identify each stage of meiosis.*  *Lesson 2: Differentiate between diploid and haploid cells.*  *Lesson 3: Questioning about their observations and how relationships work, investigate and plan questions, form ideas, and solve genetic based issues.*  *Lesson 4: Conduct investigations in relationships between variables and be able to use a range of tools, technology to gather and record information on traits*  *Lesson 5: Analyze Punnett squares and apply math and conceptual models, graphs and develop possible solutions.*  *Lesson: 6 Work as members of a team in addressing problems and evaluating case studies with their skills and make connections with science to communicate information and ideas and transition to assessing results in diseases and mutations.* |
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| **Stage 2 – Evidence** *How will you assess student learning?* | |
| **Evaluative Criteria** | **Assessment Evidence** |
| * Projects * Rubrics * Quizzes * Tests | SUMMATIVE PERFORMANCE TASK(S) (<http://www.cmu.edu/teaching/assessment/basics/formative-summative.html>):  <type here>  Students will take end of Unit Exams and also produce end of lesson projects.  Rubrics are created to assess students on their final projects.  Quiz  Tests  Genetics Unit Project |
| * Bellringers * Foldable | FORMATIVE ASSESSMENT (<http://www.cmu.edu/teaching/assessment/basics/formative-summative.html>):  <type here>  Students enter class by answering a Bellringer with the essential question being present.  Foldables are created to help students understand vocabulary. This promotes scientific dialogue in the science classroom.  Critical vocabulary: allele, gene, chromosome, sister chromatid, diploid, haploid, zygote, mitosis, meiosis, somatic cell, germ/sex cell, gametes, crossing over, synapsis, genetic recombination, autosomes, sex chromosomes, karyotype, mutations, law of independent assortment, law of segregation, heredity, genetics, offspring, genetic variability, monohybrid/dihybrid crosses, alleles, dominant, recessive, homozygous, heterozygous, genotype, phenotype, Punnett squares, pedigree, sex-linked traits, codominance, incomplete dominance |

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| **Stage 3 – Learning Plan** *What lessons will you teach, and what skills will students master, as a result of this unit?* | | | | |
| **Topical EU/EQ**  **For Lesson** | **CCSS Alignment with Stage 1** | **Formative Assessment of Lesson** | **Unit Modifications** | **Activities to Support the Lesson** |
| 1. LEARNING TARGETS: 2. How are parental genes passed on to their offspring? 3. Chromosomes and Meiosis 4. How can we predict which genes we inherit? 5. Mendel’s Laws of Inheritance and Patterns of Inheritance 6. Non-Mendelian Patterns of Inheritance and Pedigrees 7. How did we learn about DNA and genes? 8. History of DNA 9. How does the structure of DNA allow it to be used as the genetic code? 10. DNA Structure and Replication 11. How do genes determine our traits? 12. Protein Synthesis |  | • The history and major scientists responsible for the discovery of DNA  • Key scientific experiments that led to the discover of DNA  • The structure of DNA, including: nucleotide structure & base pairing rules  • The difference between purines and pyrimidines  • How DNA is replicated and the enzymes involved in this process  • That specific genes code for specific proteins  • How cells use DNA to build proteins  • The process of transcription and the enzymes involved in that process  • The process of translation and the enzymes involved in that process  • The similarities and differences of DNA and RNA  • How gene expression allows cells to specialize  • How DNA mutations affect an organism  Critical Vocabulary: deoxyribonucleic acid, ribonucleic acid, nitrogenous base, nucleotide, mutation, gene, double helix, protein synthesis, transcription, translation, codon, anticodon, tRNA (transfer), mRNA (messenger), ribosomes, amino acids, purine, pyrimidine |  |  |
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