

Teacher Name: DeRito—REVISED May 2009

COURSE TITLE/GRADE: Genetics—Course # 3245 (Semester Course) DEPARTMENT/SUBJECT: Science

	Unit 1 – September/Oct.	Unit 2 – October/Nov.	Unit 3 – Nov. / Dec.
Essential Questions	What are the fundamental terms necessary to understand genetics? What are the major branches of genetics? How does cell organization and cell cycle relate to genetics?	What is Mendelian Genetics? And how is it applied to human genetics? What are the Multifactorial traits and how do they relate to the genetic variability? How does the structure and function of DNA/ RNA relate to protein synthesis and genetics?	What are the types and causes of genetic mutation? What is population genetics? And why is it important? What is the Hardy-Weinberg Equilibrium theory and how does it apply to genetics? How are genetics and cancer related?
Content	<p>Overview of Genetic Terminology</p> <ol style="list-style-type: none"> 1. Define basic terminology of genetics. 2. Identify the major branches of genetics. <p>Review of cell organization</p> <ol style="list-style-type: none"> 3. Describe the biological levels of organization especially regarding hereditary structures. 4. Relate cell differentiation to gene expression. <p>Cell Cycle</p> <ol style="list-style-type: none"> 5. Describe the cell cycle. 6. Review the stages of meiosis specifically oogenesis and spermatogenesis. 7. Describe the process of fertilization and implantation. 8. Describe the process of development from the embryo through aging. 	<p>Mendelian Genetics and Its Applications</p> <ol style="list-style-type: none"> 1. Review Mendel’s laws as applied to human genetics. 2. Discuss exceptions to Mendelian inheritance. 3. Describe the concepts of gene linkage, genetic markers and the development of genetic mapping. 4. Compare and contrast the various types of sex linkage in humans. <p>Multifactorial Traits</p> <ol style="list-style-type: none"> 5. Discuss multifactorial traits in relation to genetic variability. 6. List and explain several multifactorial conditions. <p>DNA Structure and Function</p> <ol style="list-style-type: none"> 7. Describe the structure of DNA and how it replicates. 8. Describe types of RNA. 9. Describe transcription and translation. 	<p>Gene Mutation</p> <ol style="list-style-type: none"> 1. Describe the causes of gene mutations. 2. List several types of gene mutations. 3. Describe the structure of a chromosome. 4. List and describe several chromosomal abnormalities. <p>Population Genetics</p> <ol style="list-style-type: none"> 5. Explain and apply the Hardy-Weinberg Equilibrium theory. 6. Describe various modes of how given frequencies change. 7. Explain why specific genetic diseases occur in high frequencies among various populations. <p>Genetics of Cancer</p> <ol style="list-style-type: none"> 8. Describe cellular changes associated with cancer and tumor formation.
Skills	<p>Specific activities and labs may vary in accordance w/ student needs, differentiated instruction, and teaching time.</p> <ul style="list-style-type: none"> • Concept Diagram: Mitosis and the cell cycle 	<p>Specific activities and labs may vary in accordance w/ student needs, differentiated instruction, and teaching time.</p>	<p>Specific activities and labs may vary in accordance w/ student needs, differentiated instruction, and teaching time.</p>

	<ul style="list-style-type: none"> • ID/Order/Draw?Describe Mitosis Stages • Bead Activity: Demo Meiosis/Meiosis and how it relates to sexual reproduction and the relationship with meiosis. 	<ul style="list-style-type: none"> • ID Dominant and Recessive genes • Punnet square: Mono and Dihybrid genetic crosses • Genotype/ phenotype • “Make a Baby Lab”—dominant and recessive genes and traits • Chromosome structure • ID karyotypes of male vs. female; abnormal karyotypes • DNA structure and relationship to all living things on planet earth • Mechanism of DNA replication • RNA structure • Transcription and Translation of the DNA code • Protein synthesis • Types of RNA: mRNA, tRNA, rRNA 	<ul style="list-style-type: none"> • Chromosome Bead Activity: Demo types of mutation. • Population Genetics lab • View Cancer slides
NJ Core Content Standard	<p>SCI.9-12.5.5.C.1} Describe how information is encoded and transmitted in genetic material. (NJ Core Curr)</p> <hr/> <p>{SCI.9-12.5.5.C.2} Explain how genetic material can be altered by natural and/or artificial means; mutations and new gene combinations may have positive, negative, or no effect on organisms or species. (NJ Core Curr)</p> <hr/> <p>{SCI.9-12.5.5.C.3} Assess the impact of current and emerging technologies on our understanding of inherited human characteristics. (NJ Core Curr)</p>	<p>SCI.9-12.5.5.C.1} Describe how information is encoded and transmitted in genetic material. (NJ Core Curr)</p> <hr/> <p>{SCI.9-12.5.5.C.2} Explain how genetic material can be altered by natural and/or artificial means; mutations and new gene combinations may have positive, negative, or no effect on organisms or species. (NJ Core Curr)</p> <hr/> <p>{SCI.9-12.5.5.C.3} Assess the impact of current and emerging technologies on our understanding of inherited human characteristics. (NJ Core Curr)</p>	<p>SCI.9-12.5.5.C.1} Describe how information is encoded and transmitted in genetic material. (NJ Core Curr)</p> <hr/> <p>{SCI.9-12.5.5.C.2} Explain how genetic material can be altered by natural and/or artificial means; mutations and new gene combinations may have positive, negative, or no effect on organisms or species. (NJ Core Curr)</p> <hr/> <p>{SCI.9-12.5.5.C.3} Assess the impact of current and emerging technologies on our understanding of inherited human characteristics. (NJ Core Curr)</p>
Assessments	Tests, Quizzes, Models, Diagrams, Graphs, Labs, Worksheets Homework , Classwork	Tests, Quizzes, Models, Diagrams, Graphs, Labs, Worksheets Homework , Classwork	Tests, Quizzes, Models, Diagrams, Graphs, Labs, Worksheets Homework , Classwork
Resources	<p><u>Human Genetics (Lewis)</u></p> <p>Movies—<i>Lorenzo’s Oil</i>, <i>GATACCA</i>, <i>HHMI clips</i>, <i>films</i>, <i>Etc.</i></p>	<p><u>Human Genetics (Lewis)</u></p> <p>Movies—<i>Lorenzo’s Oil</i>, <i>GATACCA</i>, <i>HHMI clips</i>, <i>films</i>, <i>etc</i></p>	<p><u>Human Genetics (Lewis)</u></p> <p>Movies—<i>Lorenzo’s Oil</i>, <i>GATACCA</i>, <i>HHMI clips</i>, <i>films</i>, <i>etc</i></p>
Interdisciplinary Connections	SWBAT: Write an essay relating the three branches of genetics.	SWBAT: Apply Mendelian Laws and probability to mathematically predict the outcome of genetic crosses; draw/diagram DNA/RNA and the process of protein synthesis.	SWBAT: Use the Hardy-Weinberg theory to predict changes in gene frequencies; perform Chi Square Analysis.

Unit 4 – Dec./January

Essential Questions	What are the most recent advances in genetic technology and gene therapy? What is the latest reproductive technology? What is the status of the human genome project? What promise does it hold for the future of genetics?
Content	<p>Genetic Technology</p> <ol style="list-style-type: none"> 1. Describe recombinant DNA and its applications. 2. Describe transgenics and list several examples. 3. Explain the sites and types of gene therapy. 4. Explain how gene therapy is used as a treatment for cancer. 5. Explain how a chromosome is mapped. 6. Discuss the human genome project. 7. Describe problems, causes and treatments of infertility. 8. List and explain new reproductive technologies.
Skills	<p>Specific activities and labs may vary in accordance w/ student needs, differentiated instruction, and teaching time.</p> <ul style="list-style-type: none"> • “Where’s the CAT” Activity: ID Paternity using concepts of electrophoresis • Diagram gene splicing/recombinant DNA
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Assessments	Tests, Quizzes, Models, Diagrams, Graphs, Labs, Worksheets Homework , Classwork
Resources	Human Genetics (Lewis)

	Movies— <i>Lorenzo's Oil</i> , <i>GATACCA</i> , <i>HHMI clips</i> , <i>films</i> , <i>etc</i>
Interdisciplinary Connections	SWBAT: Prepare and present a powerpoint presentation on cancer/genetic disease of choice.