

Digital Unit Plan Template

Unit Title: Genetics	Name: Ramin Moheb, MD
Content Area: Biology	Grade Level: 9-12
CA Content Standard(s)/Common Core Standard(s):	
<p>HS-LS1-1. 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.</p> <p>HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.</p> <p>HS-LS3-2. 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.</p> <p>ELA standards: RI, Integration of knowledge and ideas, #7, grades 11-12: Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.</p>	
Big Ideas:	
<ol style="list-style-type: none"> 1. DNA contains our genetic information. This information is transcribed into RNA and then translated into amino acids and proteins. Proteins then carry out the instructions of DNA. 2. Some human diseases can be traced to minute mutations in DNA. These mutations translate to changes in proteins which lead to cellular dysfunction. 3. Genetic variation results from various processes including DNA replication, cellular division, and environmental factors. 	
Unit Goals and Objectives:	
<ol style="list-style-type: none"> 1. Identify the constituents of DNA and name the complementary base pairs. 2. Identify the double helix as the basic structure of DNA. 3. Represent graphically and describe verbally the major steps involved in the processes of transcription, translation, and DNA replication. 4. Describe how a change in DNA can be reflected in the structure of a protein and the function of a cell. 5. Describe how a change in DNA can result in human disease. 6. Cite evidence that genetic variation results from various processes including cellular division, DNA replication, and environmental factors. 	
Unit Summary:	
<p>This unit covers the basics of molecular genetics, from the structure and composition of DNA to gene expression and cellular function. It demonstrates the effects of changes in DNA on cellular function by exploring two human diseases. Finally, it makes a connection between cellular processes at the molecular level and genetic variation on a macro level. The learning objectives are accomplished through three diverse lessons that incorporate multiple forms of media and make extensive use of online tools:</p> <ul style="list-style-type: none"> • Lesson 1 provides essential background knowledge and an overview of protein synthesis and DNA replication through a PowerPoint presentation. The emphasis is on the big picture rather than the details of the processes. A self-quiz and online responses serve as formative assessment tools. • Lesson 2 guides students to explore these processes further and to make connections between mutations and changes in cellular function. The heart of this lesson is a webercise that guides students to explore two single-gene human disorders. A project included in the webercise serves as one of the two summative assessments in this unit. • Lesson 3 makes the connection between molecular processes and genetic diversity. Errors in DNA replication, events during meiosis, and mutations due to environmental factors are covered as sources of genetic variability. Students review classic experiments and use graphic organizers to assemble and collate evidence that inheritable genetic variations may result from these three processes. 	

Assessment Plan:			
Entry-Level: An online questionnaire (Survey Monkey)	Formative: Lesson 1: paper-based quiz, a flowsheet diagram with a written description, contribution to an online brainstorm activity, and oral response to an online question via Voicethread Lesson 2: written responses to webercise questions Lesson 3: response to online class brainstorm, graphic organizer assignment, Quizlet review for exam	Summative: 1. Webercise project 2. Unit exam (Socrative)	
Lesson 1			
Student Learning Objective: 1. Identify the constituents of DNA and name the complementary base pairs. 2. Identify the double helix as the basic structure of DNA. 3. Represent graphically and describe verbally the major steps involved in the processes of transcription, translation, and DNA replication. 4. Describe how a change in DNA can be reflected in the structure of a protein and the function of a cell.	Acceptable Evidence: Correct responses to paper-based written quiz and summative unit exam Correct responses to paper-based written quiz and summative unit exam Correct diagrammatic representations and written descriptions of the processes Correct responses to paper-based written quiz and summative unit exam	Instructional Strategies: <input checked="" type="checkbox"/> Communication <input type="checkbox"/> Collection <input checked="" type="checkbox"/> Collaboration <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Organization <input checked="" type="checkbox"/> Interaction	Lesson Activities: Read chapter 10 in Campbell's <i>Biology: Concepts and Connections</i> View PowerPoint presentation (on Lesson 1 page or unit website) Complete the guided notes that accompany the presentation (paper-based) Pause intermittently to think about questions posed in the presentation Draw diagrams representing transcription, translation, and DNA synthesis Write paragraphs describing the diagrams Make a compare/contrast list between transcription and replication Work with a partner to complete a quiz (paper-based) Respond orally to questions posed by the instructor (Voicethread)
Lesson 2			
Student Learning Objective: 4. Describe how a change in DNA can be reflected in the structure of a protein and the function of a cell. 5. Describe how a change in DNA can result in human disease.	Acceptable Evidence: Correct description of DNA mutations and cellular dysfunctions in CF or sickle cell in webercise project Correct association between DNA mutations and the effects of CF or sickle cell on humans	Instructional Strategies: <input checked="" type="checkbox"/> Communication <input checked="" type="checkbox"/> Collection <input type="checkbox"/> Collaboration <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Organization <input checked="" type="checkbox"/> Interaction	Lesson Activities: Study pre-selected videos and web pages Answer questions posed in webercise activity (on Lesson 2 page of website) Compile and organize information from videos and web pages Design an informative presentation on CF or sickle cell (rubric provided)

Lesson 3			
Student Learning Objective: 6. Cite evidence that genetic variation results from various processes including cellular division, DNA replication, and environmental factors.	Acceptable Evidence: Correctly classify classic experiments as evidence for one of three factors that contribute to genetic variability List examples of mutagens and spontaneous mutations	Instructional Strategies: <input checked="" type="checkbox"/> Communication <input checked="" type="checkbox"/> Collection <input checked="" type="checkbox"/> Collaboration <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Organization <input checked="" type="checkbox"/> Interaction	Lesson Activities: View preselected videos and web pages (Lesson 3 page of unit website) Interpret the implications of classic genetic experiments Categorize information into one of three categories Contribute to an online class brainstorm (Stormboard) Work with a partner to organize information Design a graphic organizer using a digital tool (grading criteria provided) Review unit content using an online study resource (Quizlet)
Unit Resources:			
Campbell, N. (2009) <i>Biology Concepts & Connections</i> , Chapter 10 (pp. 180-207) Unit Website - http://drmohebgeneitics.weebly.com/ Survey Monkey - https://www.surveymonkey.com/s/FYZVR93 Voicethread - https://voicethread.com/myvoice/#q.b5919741 Stormboard - https://stormboard.com/invite/98088/twin9722 , Socrative - http://b.socrative.com/ Quizlet - http://quizlet.com/45534810/genetics-self-test-edsc-304-flash-cards/ LiveBinders - http://www.livebinders.com/play/play?id=1394879			
Useful Websites:			
Learner.org - http://www.learner.org/interactives/dna/index.html Learn.genetics - http://learn.genetics.utah.edu/ Nature Scitables - http://www.nature.com/scitable DNA Learning Center - http://www.dnalc.org/resources/animations/ Learners TV - http://www.learnerstv.com/animation/Free-biology-animations-page1.htm Genetics Home Reference - http://ghr.nlm.nih.gov/ Bozeman Science - http://www.bozemanscience.com/ NCBI (NIH) - http://www.ncbi.nlm.nih.gov/ Great Pacific Media - http://www.greatpacificmedia.com/#genetics_dvds			