LESSON PLAN TEMPLATE

Lesson Plan topic: __**Making Our Own Medicine:** Protein, Lactose & Immunity____

NEXT Generation Content Standard		
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. [*Assessment Boundary: Assessment does not include identification of specific cell or tissue types, whole body systems, specific protein structures and functions, or the biochemistry of protein synthesis.*]		
Science & Engineering Practices	**Disciplinary Core Ideas**	**Cross Cutting Concepts**
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories. • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.	**LS1.A: Structure and Function** • Systems of specialized cells within organisms help them perform the essential functions of life. • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. *(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)*	**Structure and Function** • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.

Goals for Understanding

- What goals for understanding provide the guidance for how you design the lesson

Vocabulary

Identify the new academic words that should be taught in your lesson *(content vocabulary)* and the words needed to understand those ideas *(support vocabulary)*

Content Vocabulary	Support Vocabulary

Transcription	**Base pair**
Translation	**Hydrogen bonding**
mRna	**Enzyme**
tRNA	
Antibodies	
Codon	
Anticodon	

Learning activities

- 3-D Model Analysis
- Protein Synthesis Production Lab
- Video Analysis
- A. Lecture (link)
- B. Full Protein Synthesis Video (LINK)
- Codon/Anti Codon Matching Game

Assessment Activities

Day 1 Pacing Guide

Time	Task	Description of Learning Segments Student Actions Teacher Actions	Needs
5 min	**Introduce the Problem**	We will discuss Lactose Intolerance and Antibodies. What are they? What do they have in common	Have slides ready & handout
10 min	**What causes people to have problems**	**Quick Write -** Directions: Students will use the space provided to share their those on two questions: (1) What is Lactose Intolerance and why do people have it? (2) What are antibodies and how do we get them?	Have slides ready & handout
5 min	**Share Out**	The teacher will have students share some of tier responses.	n/a
10 min	**Making Protein Video**	**Directions:** To help us develop a better understanding of lactose intolerance and antibodies, we will watch a brief video and answer the following questions: (1) What are proteins? How do we make them? (2) What is Translation? (3) What is Transcription? (4) What is the central Dogma? (5) How does this explain antibodies and lactose intolerance?	Have the video cued & in the handout: (LINK)
15 min	**Small Group Define & Explain**	In your small group your will share your answers to these questions. Be sure to share your original answer and to decide on the ***group best answer.*** Share what the group decided in the space available.	Have slides ready & handout
25 min	**Post It Explanations**	Each person will use post its to write their answers and stick them to the board under the question.	Have slides ready & handout. Have Stickies available

15 min	**Teacher Lecture/ Video Lecture**	In the moments that follow, use the handout to take notes as the teacher explains the basics of Transcription, Translation, Codons, & Anticodons	Have slides ready & handout & Video Available Digital Lecture Link: (link)
5 minute	**Exit ticket**	Before we go, share your understanding: (1) What parts of protein synthesis are unclear. (2) What is transcription? (3) What is Translation?	

Day 2 Pacing Guide

Time	Task	Description of Learning Segments Student /Teacher Actions	Needs
5 min	**Introduce the Day**	The teacher will review the day.	Have slides
5 min	**Model Review**	The teacher will review the model for protein synthesis by explaining how anti codon/codon pair to make amino acids and proteins.	Have phones ready
10 min	**Video Explanation**	Students will watch a short video explaining the transcription process. (link)	Have video available (link)
10 min	**Transcription Reading**	Students will read a text that explains transcription pg 12-15.	Have reading available
30 min	**Secret Message Coding Game**	**Directions:** In the minutes that follow we will play a secret message game based on codon/anti codon pairings.	Have game in the handout & Directions on the sides
10 min	**K, W, L Exit Ticket**	**Know, What To Know, Learned:** Students will write their understanding of what they know, what they need to know and what they learned using the KWL chart.	Have handouts and slides prepared

Day 3 Pacing Guide

Time	Task	Description of Learning Segments Student /Teacher Actions	Needs
5 min	**Introduce the Day**	The teacher will review the day and discuss the standard. "We want students to prove that certain proteins are made from specific anti-codon/codon pairings." This is how the new vaccines work by giving us the codons and why some people cannot make lactase. *(lecture notes provided)*	Add notes the the slides
15 min	**Lactose Reading**	We will read pg 8 of the reading.	n/a
20 min	**Explaining Protein Synthesis & Human Medicine**	**Group Discussion:** If humans make protein and these proteins control our body's health who does DNA play a role in this. We will discuss 3 topics: a) What are antibodies and how do we make them? b) When vaccines put rna allele groups in our body, how do we make antibody proteins? c) Discuss how Lactose Intolerance is based on protein synthesis.	Have slides and handout notes available
10 min	**Each group Share Out**	Each group will share their answers	

Day 4 Pacing Guide

25 min	**Making Our Medicine Presentation Planning**	**Directions:** You will create a brief 2–3-minute video documentary explaining how our body makes our own medicine by making proteins to fight disease. This video will explain how we make Enzymes (a Protein) to process chemical reactions. Discuss Lactose. Also explain who protein synthesis explains how antibodies and vaccines work. (In your explanation use words like Transcription, Translation, Messenger rNA, Condon/ & AntiCodons)	Have handouts and slides prepared
25 min	**Documentary/ AR Video Film Making**	**Directions:** Use the minutes that follow to record your documentary. If you are using the AR application, use the filter to help your explanation.	Have handouts and slides prepared
Until Completion	**Film Festival: Share Out**	We will watch the films we produced.	