

FRANKLIN-SIMPSON HIGH SCHOOL

Course Name: Biology

Unit Name: Unit 7 – Genetics and Biotechnology

Quality Core Objectives:

Unit 7 Genetics and Biotechnology	
C.1. Genetics	a. Describe the basic structure and function of DNA, mRNA, tRNA, amino acids, polypeptides, and proteins (e.g., replication, transcription, and translation)
	b. Describe the experiments of major scientists in determining both the structure of DNA and the central dogma
	c. Use mRNA codon charts to determine amino acid sequences of example polypeptides
	d. Use mRNA codon charts to determine the effects of different types of mutations on amino acid sequence and protein structure (e.g., sickle cell anemia resulting from base substitution mutation)

Purpose of the Unit:

Students will be able to discuss the identification of DNA as the genetic material, the elucidation of the structure of DNA, and the path from gene to protein. Emphasis will be placed on relating the structure of all important molecules to their function in the processes. At the end, students should be able to evaluate predictions and results of the classic DNA experiments, make predictions about other experimental setups, and predict the effects of various point mutations on transcription, translation, and phenotype.

Prerequisites:

The basic principles of biology (from earlier chapters) and biochemistry are required to understand this material.

Daily Lesson Guide

Day	Lesson Content and Daily Focus Questions	Tasks/Procedures		Engagement	Assessment and/or Accommodations
		Knowledge or Comprehension Activities	Critical Thinking (High Yield / Literacy /LTF/etc.)		
1	What is DNA and how do we know that it functions the way we think? C.1.a; C.1.b I – ACT bell ringer (5 min) II – DNA assessment probe (15 min) III – Griffith experimental activity (35 min)	1. ACT Bell ringer	1. Assessment Probe 2. Griffith experimental activity	1. Commit and toss probe (Novelty and Variety)	1. DNA assessment probe 2. Griffith experiment questions
2	What is DNA and how do we know that it functions the way we think? C.1.a; C.1.b I – ACT bell ringer (5 min) II – Avery experiment activity (25 min) III - Hershey-Chase activity (25 min)	1. ACT bell ringer	1. Avery experiment activity 2. Hershey-Chase experiment activity	1. (working with others)	1. Experiment activity questions

3	<p>How can we get DNA out of cells?</p> <p>C.1.a</p> <p>I – ACT bell ringer (5 min)</p> <p>II – DNA pre lab questions (10 min)</p> <p>III – Map to DNA w/ procedure plan (30 min)</p> <p>IV – Experiment review quiz (10 min)</p>	<ol style="list-style-type: none"> 1. ACT bell ringer 2. Pre-lab questions 	<ol style="list-style-type: none"> 1. Map to DNA 	<ol style="list-style-type: none"> 1. Map to DNA (working with others) 	<ol style="list-style-type: none"> 1. Map to DNA picture and Q&A 2. Experiment review quiz
4	<p>How can we get DNA out of cells?</p> <p>C.1.a</p> <p>I – ACT Bell ringer (5 min)</p> <p>II – DNA extraction lab (40 min)</p> <p>III – DNA post lab questions (10 min)</p>	<ol style="list-style-type: none"> 1. ACT bell ringer 	<ol style="list-style-type: none"> 1. Post lab questions 	<ol style="list-style-type: none"> 1. DNA Extraction (Novelty and variety, Working with others) 	<ol style="list-style-type: none"> 1. Post Lab Questions
5	<p>What is the structure and function of DNA?</p> <p>C.1.a</p> <p>I – ACT Bell ringer (5 min)</p> <p>II – DNA guided notes (30min)</p> <p>III – DNA modeling Demo (5 min)</p> <p>IV – DNA modeling planning (15 min)</p>	<ol style="list-style-type: none"> 1. ACT bell ringer 	<ol style="list-style-type: none"> 1. Guided notes 2. Model planning 	<ol style="list-style-type: none"> 1. DNA modeling demo (Novelty/Variety) 2. DNA modeling (Novelty/Variety, Working with others) 	<ol style="list-style-type: none"> 1. Note Questions

6	<p>What is the structure and function of DNA?</p> <p>C.1.a</p> <p>I –ACT Bell ringer (5 min)</p> <p>II – DNA modeling competition (40 min)</p> <p>III – DNA quiz(10 min)</p>	<ol style="list-style-type: none"> 1. ACT bell ringer 2. DNA quiz 	<ol style="list-style-type: none"> 1. DNA modeling competition (Nonlinguistic representation) 	<ol style="list-style-type: none"> 1. DNA modeling (working with others) 	<ol style="list-style-type: none"> 1. DNA Quiz
7	<p>How is DNA replicated?</p> <p>C.1.a</p> <p>I – ACT bell ringer (5 min)</p> <p>II – Messelson-Stahl Experiment Activity (45 min)</p> <p>III – Replication Model preparation(5 min)</p>	<ol style="list-style-type: none"> 1. ACT bell ringer 	<ol style="list-style-type: none"> 1. Messelson-Stahl activity 	<ol style="list-style-type: none"> 1. Messelson-Stahl activity (working with others) 	<ol style="list-style-type: none"> 1. Q&A 2. Activity Questions
8	<p>How is DNA replicated?</p> <p>C.1.a</p> <p>I – ACT bell ringer (5 min)</p> <p>II – DNA replication notes (15 min)</p> <p>III - DNA replication modeling activity (35 minutes)</p>	<ol style="list-style-type: none"> 1. ACT bell ringer 	<ol style="list-style-type: none"> 1. Note taking 2. Modeling (nonlinguistic representation) 	<ol style="list-style-type: none"> 1. DNA modeling (working with others) 	<ol style="list-style-type: none"> 1. Modeling Observations
9	<p>How is the information in DNA used to make proteins?</p> <p>C.1.a;</p> <p>I - ACT bell ringer (5 min)</p> <p>II – Transcription/Translation reading annotation (15 min)</p> <p>III – Transcription/Translation organizer (35 min)</p>	<ol style="list-style-type: none"> 1. ACT Bell ringer 	<ol style="list-style-type: none"> 1. Reading annotation 2. Reading organizer 		<ol style="list-style-type: none"> 1. Organizers

<p>10</p>	<p>How is the information in DNA used to make proteins?</p> <p>C.1.a; C.1.c</p> <p>I – ACT bell ringer (5 min) II – Transcription/Translation guided notes (25 min) III – Transcription/Translation organizer (25 minutes)</p>	<ol style="list-style-type: none"> 1. ACT bell ringer 2. Notes Q&A 	<ol style="list-style-type: none"> 1. Note taking 2. Reading organizer 		<ol style="list-style-type: none"> 1. Notes Q&A
<p>12</p>	<p>How is the information in DNA used to make proteins?</p> <p>C.1.a; C.1.c</p> <p>I – ACT bell ringer (5 min) II – Transcription modeling (40 min) III – Transcription/Translation organizer (10 minutes)</p>	<ol style="list-style-type: none"> 1. ACT bell ringer 	<ol style="list-style-type: none"> 1. Modeling 2. Reading organizer 	<ol style="list-style-type: none"> 1. Modeling competition 	<ol style="list-style-type: none"> 1. Notes Q&A
<p>13</p>	<p>How is the information in DNA used to make proteins?</p> <p>C.1.a; C.1.c</p> <p>I – ACT bell ringer (5 min) II – Translation Modeling (40 min) III – Transcription/Translation organizer (10 minutes)</p>	<ol style="list-style-type: none"> 1. ACT bell ringer 	<ol style="list-style-type: none"> 1. Modeling 2. Reading organizer 	<ol style="list-style-type: none"> 1. Modeling competition 	<ol style="list-style-type: none"> 1. Model judging

14	<p>How do changes in DNA affect organisms?</p> <p>C.1.c; C.1.d</p> <p>I – ACT bell ringer (5 min) II – Mutation Guided notes (20 min) III – Mutation activity (30 min)</p>	<ol style="list-style-type: none"> 1. ACT bell ringer 2. Mutation questions 	<ol style="list-style-type: none"> 1. Guided notes 2. Mutation Questions 	<ol style="list-style-type: none"> 1. Human disease study in mutation activity 	<ol style="list-style-type: none"> 1. Notes Q&A 2. Mutation activity questions
15	<p>What is the role of DNA in organisms?</p> <p>C.1.c; C.1.d</p> <p>I – ACT bell ringer (5 min) II – DNA unit Quiz (20 min) III – DNA test review (30 min)</p>	<ol style="list-style-type: none"> 1. ACT bell ringer 2. Quiz 	<ol style="list-style-type: none"> 1. Quiz 2. Test Review 		<ol style="list-style-type: none"> 1. Test Review 2. Quiz
16	Unit Exam				