TITLE OF LESSON

Biology Unit 1 Lesson 29 – Genetic Code, mRNA, tRNA and rRNA, and Protein Translation

*How do cells store and transfer information?*

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TIME ESTIMATE FOR THIS LESSON

One class period

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ALIGNMENT WITH STANDARDS

California – Biol CB 1d; G4a-b & G5a-b

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MATERIALS

**Codon Tables** – Student Page

**Teacher's Notes Lesson 29 –** Teacher Page

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LESSON OBJECTIVES

- To understand the genetic code
- To decipher the genetic code
- To understand how a cell uses the genetic code
- To understand how tRNA and rRNA function
- To understand how proteins are formed
- To understand the mechanism by which proteins are made

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EXPLANATION OF LESSON

This lesson is designed to teach the students about the deciphering code that is used in cells to change from the language of nucleotides to the language of amino acids. The object of the lesson is to understand how translation from one language to another occurs. They will learn about the genetic code, the deciphering code between the two languages (nucleotides and amino acids). They must also incorporate all the parts of the protein translation system, understand their individual roles and how they function together to form a protein. They will have to digest how the languages flow from one to another to get work done in the cell. Make sure you have photocopied the handout **Codon Table** for each student.

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FOCUS AND MOTIVATE STUDENTS – WARM-UP ACTIVITY

1) Homework Check – Collect the reading assignment from last night as well as their DNA/RNA homework. Hand back all graded assignments. Ask students to take out the first draft of their Evaluation Essay #1. Initial all completed first drafts.
2) Agenda – Have students copy the agenda you posted.
3) Peer Revision – Have them exchange evaluation essays with a partner. Tell them to revise their partner's paper using their **Evaluation Essay #1 Requirements** sheet instructions in STEP 3. Remind students that they will be writing their second draft tonight for homework. Give them 20 minutes to complete this portion of the assignment. If they can not finish in 20 minutes, it will be their responsibility to get together with their partner outside of class to complete the revisions. At the end of 20 minutes, call time. Ask them to give the essay back to the author. Have them put it away.
4) Codon and Anticodon – Write the following on the board: DNA – nucleotide, RNA – nucleotide, protein - amino acids.

   mRNA – codon  tRNA – anticodon

5) Vocabulary Concepts – Give the students two minutes to come up with a definition for codon and anticodon by looking at the root words and prefix. They should at least be able to realize that anticodon must be the opposite of codon, even if they don't figure out the rest. They should write these words and their definitions in their vocabulary notebooks. Explain that they will be looking at the function of RNA in the cell, especially the interaction of mRNA and tRNA via codons and anticodons. The codons are part of the genetic code they will be deciphering today.

ACTIVITIES – INDIVIDUAL AND GROUP

1. Display Images – Look for images of the codon table, tRNA, mRNA, rRNA and protein translation to use for the class. They can be found in your textbooks or at http://gened.emc.maricopa.edu/Bio/BIO181/BIOBK/BioBookPROTSYn.html.

2. Note Taking – Assign a note taker to take notes on the overhead, while the students take notes in their notebooks. Remind students to underline all new vocabulary and learn it as they will be responsible for it. Leave a couple of minutes to Applaud/Critique the quality of the notes at the end of the lecture/discussion.

3. Lecture – Present the Genetic Code material in **Teacher's Notes Lesson 29.**

4. Pair Work – When you finish, give the students a copy of the handout **Codon Table** containing the codons that form amino acids. Ask the students to work in pairs. They are responsible for looking at the chart and determining if there are any patterns within the chart. Is there only one codon for each amino acid? If not, how many are there? Make a list of all the codons for one amino acid. How are they grouped? Give them 5-10 minutes maximum to work on the project, then meet as a class and discuss the patterns they found.

5. Lecture 2 – Now present the **Translation of mRNA…** material in **Teacher's Notes Lesson 29**. Have students take notes.

6. Compare and Contrast – When you finish, ask the students to compare what they wrote about a normal assembly line with the so-called protein assembly line in a cell. Choose a student to write what is similar and what is different on the board next to their previous points. This information should be written in their notes as well, and a copy made for the class folder. How similar and different did they find the systems?

7. Create and Decipher mRNA Sequence – Have the students work in pairs to create an mRNA sequence. When they have finished, have them pass it on to another pair and that pair must decipher which sequence of amino acids it will form by using the **Codon Table**. Ask the partners to sign their name to their answer. When all students have completed their answers, have them give the paper back to its author. Have the author's tell them if their answer was correct. Next to their pair's names at the top of the paper write "Correct or incorrect" depending upon whether or not their answer was right. Tell students they will be graded on the mRNA sequence they created and on their answers as well. Collect all papers.

8. Homework Review – Tell the students that there will be a quiz on the mRNA transcription and translation material tomorrow. So they should study their notes. Review the rest of their homework assignments.

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HOMEWORK

1) Read Starr's textbook *Biology Concepts and Applications*, chapter 13, pp. 204-207 or other reading material that contains the genetic code, the structure and function of tRNA and rRNA, and translation of mRNA into proteins. Write up 5 questions you have about the main ideas presented. Then attempt an answer to each based on your reading and the class notes.
2) If the students didn't finish writing or translating their mRNA sequences into a protein using the codon table, have them finish it as homework.
3) Write up the second draft of your Evaluation Essay #1.

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GROUP ROLES

Manager – The manager will get the **Codon Table** handouts.
Recorder – The recorder will make a copy of the data for the folders. All students are recorders and should be writing down their answers to be placed in their binders.

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DOCUMENTATION FOR PORTFOLIO

Lab Report #1
Method – Photoshop Image
Lab Report #2