Teacher's Name(s): Lisa Franchetti, London Smith
Subject/Course: Biology
Date: 6/28/17

Unit: DNA Unit
Lesson 3: What is RNA? How is it made from a DNA template?

Essential Questions from CB Course of Study:

- How is the hereditary information in genes inherited and expressed?
- How might transcription produce a RNA molecule?
- What is the general structure of a RNA molecule?
- What does the processes of transcription do?

Academic Standards:

- BIO.B.1.2 Explain how genetic information is inherited
    - BIO.B.1.2.1 Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.
    - BIO.B.1.2.2 Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance.
- BIO.B.2.2 Explain the process of protein synthesis (i.e. transcription, translation, and protein modification).
    - BIO.B.2.2.1 Describe how the process of transcription and translation are similar in all organisms.

Objectives/Learning Targets:

- Describe how the processes of transcription is similar in all organisms
- Explain the steps in transcription.
- Model the steps in transcription.
- Create a computer based model of transcription.
- Explain how DNA is used as a template to build RNA.
- Describe the different types of RNA.

Differentiation:
Flexible Grouping
Individual v Group Work
Pick your Station
Peer to Peer Instruction
Scaffolded Instruction based on pretest results
Different Pacing for Assignment completion
Read and write learners write a book report.
Visual learners create a graphic organizer of the story.
Auditory learners give an oral report.
Kinesthetic learners build a diorama illustrating the story.

Checking for Understanding:
Pretest
KWL Charts
5 hardest questions

Open Ended Questioning
Individual conferences- individualized feedback
Formal Assessments- quizzes, unit test
Lab

Homework/Academic Practice:
Active Reading from genes to Proteins.

Materials:
Active Reading Worksheet
Transcription Slideshow
DNA Modeling Kit

Knowledge Taxonomy:
Nucleotides
Ribose
Adenine
Uracil
Guanine
Cytosine
Purine
Pyrimidine
Base Pairing Rules
Transcription
RNA Polymerase

Instructional Procedures
Review the general structure of RNA as introduced during the Organic Compound Unit (Chapter 2 Holt Biology Textbook). Students should be able to identify the structure of RNA as being composed of Nucleotides (containing Sugar, Base, and and Phosphate group), the 4 different bases (adenine, guanine, cytosine, and uracil), is in the form of a single strand , and that RNA is used to as a template to make proteins.

Anticipatory Set (5)
1. How is the information in the DNA use to control the functions of the cell?
2. What are the roles of RNA in this process?
3. What are the three types of RNA?

Instructional Input (40)
Introducing New Learning (15 minutes)
Introduction to Transcription- Google Slides- Teacher guides students through the steps of Transcription. (Attached in Shared Folder).
Students view Transcription video
https://www.youtube.com/watch?v=5MfSYnItYvg&t=6s
Students will review the rules of complementary base pairing and discuss how DNA nucleotides are used to transcribe RNA nucleotides

Student Practice (25 minutes)

Students will complete the transcription quick lab modeling transcription through a hands-on demo. Students will work with models to simulate Transcription building RNA strands from sample DNA sequences.

Interactive Websites:
https://whyy.pbslearningmedia.org/resource/lsps07.sci.life.stru.celltrans/cell-transcription-and-translation/#.WVWj8BMrJPM
http://learn.genetics.utah.edu/content/basics/transcribe/
http://www.zerobio.com/drag_oa/protein/transcription.htm

Checking for Understanding (Ongoing)

1. Key Idea, Question, or Challenge: Students write a key idea they've learned, a question they have, or something they're finding challenging.
2. T or V: Students can choose to summarize information using either a T-chart or a Venn diagram, whichever will best help them communicate their understanding.
3. Write or Draw: To relay key ideas, summarize information, or even ask a question, students can choose to either write a few sentences or draw a picture or diagram.
4. Alone or Together: Students will list questions they have about a topic being studied. They can brainstorm questions either alone or in a small group, whichever they think best.
5. Highlight an Example: If students have been working on a variety of problems or examples, at the end of the period they choose one. You decide what the focus will be: One they are proud of? One that was hard? One they aren't sure about? Students can explain their choice, jotting a sentence or two on a sticky note and attaching it to the problem.
6. Square, Triangle, or Circle: Students choose one of these shapes as a form of reflection. A square is for something that squared with their thinking (reinforced something they already knew/believed). A triangle is for three key/important ideas. And a circle indicates a question still circling around in their mind.

Closure (5 minutes)

Exit Ticket
Compare and Contrast Transcription and DNA Replication. Be sure to include details about the enzymes, cellular locations, nucleotides involved,etc.

Lesson Reflection

In this lesson, I ……

Stated my learning targets in clear, student friendly language
Actively engaged students
Checked for understanding
Kept the pace of the lesson, completed in the time allotted, and provided student-centered closure

Teacher's Name(s): Lisa Franchetti, London Smith
Subject/Course: Biology
Date: 6/28/17

Unit: DNA Unit
Lesson 4: Coding Transcription

Essential Questions from CB Course of Study:

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- How might transcription produce a RNA molecule?
- What is the general structure of a RNA molecule?
- What does the processes of transcription do?

Academic Standards:

- BIO.B.1.2 Explain how genetic information is inherited
    - BIO.B.1.2.1 Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.
    - BIO.B.1.2.2 Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance.

Objectives/Learning Targets:

- Describe how the processes of transcription is similar in all organisms
- Explain the steps in transcription.
- Model the steps in transcription.
- Create a computer based model of transcription.
- Explain how DNA is used as a template to build RNA.
- Describe the different types of RNA.
- Describe how scientific knowledge, explanations and technological designs may change with new information over time (e.g., the understanding of DNA, the design of computers).

Differentiation:
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Open Ended Questioning
Individual conferences- individualized feedback

Formal Assessments- quizzes, unit test
Lab

Homework/Academic Practice:
https://www.codecademy.com/learn/python

Materials:
Projector
Student computers/laptops
Coding instructions

Knowledge Taxonomy:
Len ()
String
Variable
While loop
If/else
Comments (#)
Print
Operators (==, +=)

Instructional Procedures
Anticipatory Set (10 minutes)
Review information from Lesson 3
*What is transcription? (*T to U)
Instructional Input (35 minutes)
Introducing New Learning (10 minutes)
Review Python coding vocabulary from Lesson 2 and new coding concepts (==, +=)
Use the code from Lesson 2 for review
Student Guided Practice (20 minutes)
Based on the code to replicate the DNA what Python tools might you use to transcribe a DNA sequence?
Make a plan with your students for what the code needs to do: turn T's to U's
Work through the code with your students on the board as they play with the code individually on their computer

```
sequence =
"atgtccgagtctttcggtgcgagggaaataaatctcctccagacagataagagtctgctttcctcgatcgcaccgctgtcaatttcaa
accattgggacccttcgaagtgctatctagtatacatcgtcaaggaacctatacgcccatag"
rna= ""
seqlen = len(sequence)

print seqlen

count = seqlen - 1

#transcribe DNA sequence to RNA sequence
i = 0
while (i <= count):
   #go through the sequence, and wherever there is a 't', add a 'u' to the RNA variable (which
is an empty string in line 2)...
   if sequence[i] == "t":
```

```
        rna += "u"
    #...otherwise just add the sequence to the RNA empty string
    else:
        rna += sequence[i]
    #i is the placement in the DNA sequence as it loops through, so you have to add 1 to move
on to the next space to loop through the whole thing
    i=i+1

print rna
```

Checking for Understanding (5 minutes)

Give students a different DNA sequence to transcribe with their code

Closure (5 minutes)

Open Ended Questioning

Lesson Reflection

In this lesson, I ……

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