Unit Plan Part II Template Megan Butler

Use the table below to complete part 1 of your Unit Plan Assignment.

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| Objective | Possible Teaching Strategies | Final Choice | Rationale |
| Students will be able to recognize the DNA structure and identify the main components that make up the backbone and ladder of the DNA molecule. | -Building DNA strands  -Powerpoint lecture  -Showing a model DNA structure while they label. | Building a DNA strand out of molecule building blocks as a class | Students will be given materials that represent each component of a DNA molecule (phosphate. Sugar groups, and nucleotides) and as a class, we will construct the DNA in its antiparallel double helix form. This will give then a hands on way of learning what DNA looks like as it is tangible to the students. |
| Students will be able to state where the DNA is located within the cell and the purpose and function of DNA. | -Short video  - Worksheet | A video of DNA in its double helix shape (reinforcing yesterdays objective) and where the DNA is located. | Students will watch a short video on how the DNA is coiled up within the nucleus. This visual is better seen then explained. For audio learners, I will talk through the video to explain the location and why it is located there. |
| Students will be able to identify each of the 4 base pairs in a DNA sequence and illustrate correct pairing of A-T; C-G. | -Online game  -powerpoint  - worksheet | Powerpoint explaining the logistics behind matching bases then an online game that allows the students to practice on their own. | Student will play an online game after an introduction to base pairing and will be able to practice matching the bases. This will give them continuous practice through a fun matching game. |
| Students will recognize that many components together create the supercoiling of the DNA and the negatively charged DNA is attracted to the positively charged histones allowing the chromosome to condense. | -demonstration  -worksheet  -pictures | Demonstration using telephone cord and ball and pictures | I will demonstrate the supercoiling of DNA around a histone with the use of a ball and telephone cord. I will also show pictures on how this condenses into a chromosome. This physical demonstration will probe their thought process on the charges of both the histone and DNA. |
| Students will be able to outline the steps of replication | -time line  - lecture | Both the start of the unit timeline and a lecture. This timeline will be kept and added to as we progress. | After a lesson briefing on DNA replication, students will create a timeline of the central dogma starting with DNA replication. As a class we will describe each phase and add drawn pictures to this timeline. This timeline will be something they can keep with them to help with homework assignments and a studying. |
| Students will be able to diagram the differences between DNA and RNA | -van diagram  - lecture  - game | A lecture on the introduction to RNA then a van diagram game comparing DNA to RNA. | After a lecture, we will have a DNA and RNA team that is competing to create a chart of similarities and differences between DNA and RNA. The first team to write the most facts (that are accurate) will get an extra credit point for participation. This will be a fun interactive way to jog their memory on DNA while applying new concepts learned on RNA. |
| Students will be able to explain the 3 types of RNA and identify where they are present in transcription and translation | -powerpoint  -timeline  - literacy of corresponding bases and how each differs in all three types | Powerpoint lecture addition to the timeline. | Students will be lectured on the three types of RNA. As a class we will add to the timeline which included both transcription and translation. (both processes will not be completed in one day) they will also include the differences in the three RNA molecules within their timeline. We will then contrast the RNA differences when applied to transcription and translation by showing picture/ powerpoint/ video of how each RNA molecule is applied to the process. |
| Students will be able to apply the concept of RNA being decoded to amino acids in the process of translation while using proper substitution for T/U | Reinforcement worksheet | Reinforcement worksheet will be given as practice on the change in nucleotide base. | An in-class worksheet will be given to the students and will entail many practice questions on DNA to RNA with emphasis on the base change from T to U. this practice will help make this change concrete in their brains. |
| Students will be able to process DNA to RNA to Amino acids using correct base pair and codon matching | -performance mock assessment (practice)  -computer game | Both a computer game and practice performance assessment | As a class we will go through a simulation game of the process of DNA to RNA to amino acids. I will have it projected on the overhead as they pick the correct bases that are inserted. I will reinforce each choice by an explanation. As the class works on the computer game individually, I will take groups of 4 to show me the process using a given strand of DNA. (base pieces will be needed during this for DNA and RNA) |
| Students will be able to comprehend the different types of mutations and how they affect DNA sequences | -mutation worksheet on different types of mutations  -research assignment | -mutation worksheet on different types of mutations and research assignment | Students will be lead through what mutations are and how they affect our DNA, they will then go through a mutation worksheet that addresses the different types of mutations.  Students will also research a disease caused by a specific type of mutation and create a write up of what the disease entails/ how the mutation occurs/ what amino acid is replaced. |

Use the table below to complete part 2 of your Unit Plan Assignment.

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| Objective | Possible Assessment Strategies | Final Choice | Rationale |
| Students will be able to recognize the DNA structure and identify the main components that make up the backbone and ladder of the DNA molecule. | -Handout assessment with labeling of DNA components  -Essay  -Performance based test on building a DNA strand | Performance based test on building a DNA strand | Students will be assessed individually on assembling a DNA molecule in front of the assessor while being graded on precision of piece location and their verbal response to each component’s structure name and function. |
| Students will be able to state where the DNA is located within the cell and the purpose and function of DNA. | -Test question  -Drawing | Test question (multiple choice) | On the summative test, students will be given a multiple choice question on where the DNA is located within the cell. They will have other opportunities to draw, the video was a good enough visual to where they do not need to draw for this objective. |
| Students will be able to identify each of the 4 base pairs in a DNA sequence and illustrate correct pairing of A-T; C-G. | -Test question  - final game score | Game score | After various practice games, students will be required to take a short base pairing assessment through a final game. They will have as many practice rounds as they like before being assessed. |
| Students will recognize that many components together create the supercoiling of the DNA and the negatively charged DNA is attracted to the positively charged histones allowing the chromosome to condense. | -test question  -graded worksheet | - graded worksheet(take home quiz) | Students will have to complete a worksheet about chromosome condensation and the role of the histone protein. |
| Students will be able to outline the steps of replication | -timeline exam | Timeline exam | During their written exam, students will be required to create their own timeline and explain the steps of the central dogma, including the details on DNA replication. |
| Students will be able to diagram the differences between DNA and RNA | -diagram for written quiz  - multiple choice questions. | Students will have a quiz on the differences and similarities as well as a few multiple choice questions on the summative exam. | Because the overall comparisons of DNA and RNA help in learning many components of the central dogma theory, I will have both a written quiz similar to the diagram activity as well as questions on the exam. |
| Students will be able to explain the 3 types of RNA and identify where they are present in transcription and translation | -time line exam | - time line exam | This will be a part of their final time line exam. All three types of RNA and their functions will need to be included. |
| Students will be able to apply the concept of RNA being decoded to amino acids in the process of translation while using proper substitution for T/U | Exam questions | Exam questions | Several exam questions will require the applied skill of translating and transcribing. |
| Students will be able to process DNA to RNA to Amino acids using correct base pair and codon matching | -exam question  - | An analysis question will be given that asks them to correctly transcribe DNA to RNA then RNA to amino acid. | This analysis question will show true understanding by requiring them to break down the central dogma and show understanding of bases, codons, and amino acids with corresponding DNA and RNA. |
| Students will be able to comprehend the different types of mutations and how they affect DNA sequences | -exam question | Exam question | Students will apply what they know about mutations by solving a mutation mystery on the exam. They will need to correctly identify the type of mutation and figure out what base and amino acid was substituted. |

Use the table below to complete part 3 of your Unit Plan Assignment.

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| Science Laboratory Skill | Related Objective(s)? | Teaching Strategy? |
| Looking at cell division under a microscope to be able to relate mitosis to DNA replication and the original location of DNA within the cell. Students will have a chance to revisit slides from previous that year to see the actual location of DNA in the nucleus. | Students will be able to state where the DNA is located within the cell and the purpose and function of DNA. | Video/ slides. I will have pictures on the board similar to exemplify what the video showed and will come around to make sure students are drawing where the DNA is located in their notebooks. This lab is more of a memory stimulating activity that will help them connect previous lessons to the specifics of DNA. |
| Students will be given a prompt that asks questions on base paring and the bonds between the nucleotides. The lab stations will include base pieces they need to match together using magnetic force based on what base the prompt elects the group to start pairing with. | Students will be able to identify each of the 4 base pairs in a DNA sequence and illustrate correct pairing of A-T; C-G. | The computer game activity that was completed will help them apply what they learned to a prompt. Each group will have to start base pairing at a different base and they will see how DNA differs among organisms. We will compare all the strands matched together as a class. |
| During lab, students will have to use materials provided (pipe cleaners, candy pieces)and their imagination to go through DNA replication, transcription and translation . They will have to show the instructor the separation of the strands and the complimentary paring of both templates, the complimentary strand from DNA to mRNA, and the anticodon paired with each codon producing a given amino acid. ( students will have a full day to create this process) | Students will be able to outline the steps of replication | Students will have time to create their own process and will need to show how DNA polymerase seperates the strands and how the templates are binded to the complimentary bases, ect. This will help solidify the entire replication/ transcription/ translation process while using their creativity. They will be checked off at the end of class by the instructor. |
| Students will be to explain the 3 types of RNA and identify where they are present in transcription and translation |
| Students will be able to apply the concept of RNA decoded to amino acids in the process of translation while using proper substitution for T/U |
| Problem based learning. Students will become more familiar with mutation by solving a mutation mystery. They will be given a prompt and will have to solve the mutated base for each lab station. Each station will differ in the type and location of the mutation. This problem solving lab will require critical thinking and full understanding of mutations. | Students will be able to comprehend the different types of mutations and how they affect DNA sequences | As a class, we will go over the assignment on mutations from the previous day. I will clear up any misconceptions or confusions the class has and then will let them participate in the inquiry lab on their own. I will be walking around to make sure everyone is on track.  Toward the end of class we will discuss the mutations and how they were found. |

Use the table below to complete part 4 of your Unit Plan Assignment.

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| Science Literacy Skill | Related Objective(s)? | Teaching Strategy? |
| Exploring questions based on why the structure is assembled that way and why antiparallel orientation is important. | Students will be able to recognize the DNA structure and identify the main components that make up the backbone and ladder of the DNA molecule. | Building a DNA strand teaching strategy explained in the first chart. |
| Students will be able to relate the location of the DNA to the process of mitosis learned earlier that semester. This will connect the concept of DNA and replication of DNA. | Students will be able to state where the DNA is located within the cell and the purpose and function of DNA. | The video and the lab with show specifics on the properties of DNA in the nucleus. This will be a good introduction to DNA replication. |
| Deductive reasoning on matching each base with the proper pair. ( if A then pair must be T on complimentary strand) | Students will be able to identify each of the 4 base pairs in a DNA sequence and illustrate correct pairing of A-T; C-G. | Computer game |
| Problem solving dealing with how the DNA binds to the histone (positive and negative charges) | Students will recognize that many components together create the supercoiling of the DNA and the negatively charged DNA is attracted to the positively charged histones allowing the chromosome to condense. | The demonstration will show them how the DNA binds to the histone. Since they have learned previously that DNA is negatively charged, they will use clues I give them and class discussion to figure out that the histone protein is positively charged. |
| Exploring the process of DNA replication using materials in an inquiry based lab | Students will be able to outline the steps of DNA replication. | This exploration process will help students answer their own question. By going through the entire process with tangible objects, they will see DNA replication more clearly. |
| Computing the outcome of mRNA and tRNA (anticodon) bases when given a DNA strand | Students will be to explain the 3 types of RNA and identify where they are present in transcription and translation. | Through an activity, we will go through how each base is assigned. This will be a class activity that will be gone through many times to make sure the students really understand it. By the end of this lesson, students will be able circle what template strand is used in DNA and the synthesized mRNA strand, what the ribosomes do, and what the anticodon would be for a given codon on the mRNA. |
| Comprehension skills and deductive reasoning showing if DNA then what possible bases; if RNA then what possible bases, and significance of codon. | Students will be able to apply the concept of RNA decoded to amino acids in the process of translation while using proper substitution for T/U | The worksheet in class will help them practice the processes in order to comprehend the differences in sequence. |
| Deductive reasoning to find out what base matches and which ones do not. They need to process not only DNA to complimentary strand, but DNA to RNA using the correct change over from T to U followed by correct codon matches. | Students will be able to process DNA to RNA to Amino acids using correct base pair and codon matching. | This lesson focuses on the entire decoding sequence from replication to translation. As a class we will review the timeline and go through the steps slowly to show how precise the process is. |
| Problem solving,  Drawing a conclusion and evaluating the conclusion. Students will need to use what they know about mutations to correctly work backwards from the problem to the source of the problem. | Students will be able to comprehend the different types of mutations and how they affect DNA sequences | Through lab, practice worksheets and various examples I will be able to help them problem solve mutations for further understanding of what they are and how they act on DNA. |

**Unit Plan Overview (Part 5)**

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| **Day** | **Objective** | **Teaching Strategy** | **Assessment Strategy** | **Notes** |
| 1 | Students will be able to recognize the DNA structure and identify the main components that make up the backbone and ladder of the DNA molecule. | Building DNA strand | Performance test on building DNA strand. (application) | The class will be provided with molecular structures for both the activity and assessment; computer |
| 2 | Students will be able to state where the DNA is located within the cell and the purpose and function of DNA. | video | Multiple choice test question on where the DNA is located. (knowledge) | computer |
| 3 | Students will be able to identify each of the 4 base pairs in a DNA sequence and illustrate correct pairing of A-T; C-G. | Computer game | Final game (application) | Computer game, computer, and base pair pieces |
| 4 | Students will recognize that many components together create the supercoiling of the DNA and the negatively charged DNA is attracted to the positively charged histones allowing the chromosome to condense. | Demonstration | Worksheets (take home quiz) application | Phone cord and ball will be needed for this assessment, computer |
| 5 | Students will be able to outline the steps of replication. | Timeline/inquiry lab | Timeline exam (understanding) | Pipe  cleaners, candy pieces, other representable materials for DNA replication, computer |
| 6 | Students will be able to diagram the differences between DNA and RNA. | Van diagram game | Van diagram quiz (understanding) | Board, markers  Computer |
| 7 | Students will be to explain the 3 types of RNA and identify where they are present in transcription and translation. (2 day objective) | Added timeline/ DNA RNA literacy activity | (no assessment this day) | Patience! |
| 8 | Students will be able to explain the 3 types of RNA and identify where they are present in transcription and translation. | (Continuation from previous day)timeline, DNA RNA literacy activity | Timeline test (understanding) | Computer, timeline |
| 9 | Students will be able to apply the concept of RNA decoded to amino acids in the process of translation while using proper substitution for T/U. | Reinforcement worksheet. | Analysis test questions | Part of lab using candy and pipe cleaners, computer, worksheet. |
| 10 | Students will be able to process DNA to RNA to Amino acids using correct base pair and codon matching. | Both a computer game and practice performance assessment | Analysis test question | Computers, DNA and RNA pieces. Computer game |
| 11 | Students will be able to comprehend the different types of mutations and how they affect DNA sequences . (2 day objective) | Research assignment in class. | The research assignment will be looked at as a grade on accuracy | Computer, worksheet, |
| 12 | Students will be able to comprehend the different types of mutations and how they affect DNA sequences. | mutation worksheet on different types of mutations | Analysis test question (accuracy of research assignment will be graded as well) | Lab prompt on mutations, cut out bases to help them match each nucleotide, computers |