



Python Coding Lesson

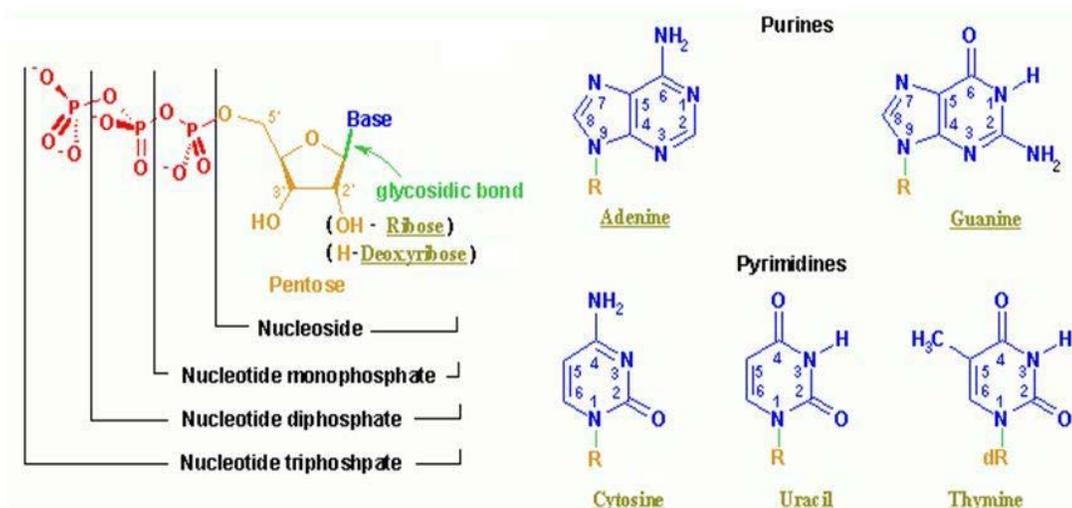
Lesson Title:	Nucleic Acids and Nucleotides
Grade Level:	High School
Subject:	Chemistry
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Engagement:

- Students will be shown regarding the importance of DNA
 - Provide the students some facts about DNA and RNA that will peak their interest and they can relate to.
 - Ex. 1: You have 98% of your DNA in common with a chimpanzee
 - Ex. 2: Every human being shares 99% of their DNA with every other human.
 - Ex. 3: Humans and cabbage share about 40-50% common DNA
- Students will then watch a video regarding the DNA & RNA. Introductory to refresh memory and catch their attention.

Nucleic acids

1. Nucleoside:



Source: https://en.wikipedia.org/wiki/Nucleic_acid_metabolism



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- What kind of questions should the students ask themselves after the engagement?
 - 1. How is DNA important in all living organisms?
 - 2. How do DNA and RNA differ?
 - 3. What are DNA and RNA composed of?

Exploration:

- After being reintroduced to DNA and RNA (since they would have taken 10th Grade Biology) the students will be required to define the main terms regarding RNA and DNA.
 - Such as: DNA, RNA, DNA Polymerase DNA Helicase, Ribose, Deoxyribose, Nucleic Acid, Nucleotides, Thymine, Uracil, Adenine, Guanine, Cytosine, Nucleobase, Sugar Phosphate Backbone
 - Define which nucleobase matches with the other
 - Adenine = Guanine, Cytosine = Thymine
 - Then students will be given a worksheet that has the structure of the DNA on it. With this worksheet, students will have to label the sugar phosphate backbone, and base pairs.
 - List “big idea” conceptual questions the teacher will use to encourage and/or focus students’ exploration.
 - How can a mismatched base pair affect the structure of the DNA or RNA?

What is the importance of the sugar phosphate backbone?

Explanation:

- Students share out their understanding and findings before any terms or explanations are given.
 - Students will share their more in-depth knowledge on the base pairs and their purposes.
- What questions or techniques will the teacher use to help students connect their exploration to the concept under examination?
 - Students will recall their basic knowledge from 10th grade biology to their new in-depth knowledge of RNA & DNA. How do the sugar phosphate backbones support the RNA and DNA?
- List higher order thinking questions which teachers will use to solicit *student* explanations and help them to justify their explanations.



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- How do DNA and RNA differ from one another?
- How and why do each of the pairs go with one another? Adenine to Guanine? Cytosine to Thymine?

Elaboration:

- Describe how students will develop a more sophisticated understanding of the concept.
 - Students will go through visual worksheets showing them the DNA helicase, and will describe each nucleobase (Adenine, Guanine, etc).
- What vocabulary will be introduced and how will it connect to students' observations?
 - DNA polymerase, RNA, Helicase, Adenine, Guanine, Thymine, Cytosine, Replication Fork, Sugar Phosphate Backbone. These new vocabularies will be the more in-depth foundation of their knowledge on Nucleotides and their pairing and how the DNA forms.
- How is this knowledge applied in our daily lives?
 - Humans, living creatures, anything with DNA is formed with these nucleotides and is seen in our daily lives. This knowledge will allow for further growth in the field of Biology, research portion of the program given, since it is a simple one.)
 - Students will create a structure of either DNA or RNA that shows and explains the relation between the base pairs and the importance of the sugar phosphate backbone. An image of DNA and RNA will be showed throughout the lesson, so they understand the shape and placement of the base pairs and backbone.
 - ch and basic knowledge of DNA.

Evaluation:

- How will students demonstrate that they have achieved the lesson objective?
 - Students will be asked to create a program that allows them to give a nucleotide and request the matching nucleotide base. (Students should have simple prior knowledge of python, and will create the program by themselves, with n



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Code:

```
print ("Hello there! ")
print ("Match Each Nucleotide_base with its match base. ")
answer = raw_input ("What is the base pair of Adenine?")
if answer.lower() == "thymine":
    print("That is correct!")
else:
    answer= raw_input ("Guess again! ")
    if answer .lower() != "thymine":
        print("Sorry the correct answer is thymine.")
    else:
        print("That is correct!")
answer = raw_input ("What is the base pair to cytosine?")
if answer.lower() == ("guanine"):
    print ("That is right! ")
else:
    answer = raw_input ("Guess again! ")
    if answer.lower != ("guanine"):
        print ("Sorry the correct answer is guanine.")
    else:
        print ("That is correct!")
```



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```
answer3 = raw_input ("Select which Nucleotide_base has two hydrogen bonds? Either: adenine  
to thymine or cytosine to guanine? ")
```

```
if answer3.lower() == ("adenine to thymine"):
```

```
    print ("Good job! ")
```

```
else:
```

```
    print ("That is incorrect! ")
```