**Unit 7: DNA and Protein Synthesis**

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| **A. Demonstrates an understanding of Nucleic Acid structures and basic function. *“I can . . .”*** | **Mastery Quiz Results** | **Mastery Reflection:What do I still need to master before the exam?** | **Resources for Mastery** |
| * Identify common structures of nucleotides (sugar, phosphate, N-base)
* Contrast purines and pyrimidines
* Identify all nitrogen base pairings
* Explain complementarity in terms of size of N-bases and the H-bonds - how is this critical to DNA structure?
* Compare/contrast nucleotides & nucleic acids
* Identify processes that build/take apart nucleic acids
* Contrast structure and function of DNA & RNA
* Identify the major function of nucleic acids & explain why the order of base pairs is critical to this function
* Explain the relationship between DNA, genes, and chromosomes
* Understand the contributions, made by scientists in the discovery of the structure of DNA
* Be able to replicate a strand of DNA
 |  |  | See website and text for:* Sect. 3.11
* Sect 8.5

\* DNA interactive website\* Essential Study Partner:* Unit: Cells

 Topic: Chemistry🡪  Nucleic Acids* Unit: Genetics

 Topic: DNA Bozeman videos:<http://www.bozemanscience.com/what-is-dna><http://www.bozemanscience.com/dna-replication> |
| **B. Demonstrates an understanding of Protein structures & general protein functions.  *“I can . . .”*** | **Mastery Quiz Results** | **Mastery Reflection:What do I still need to master before the exam?** | **Resources for Mastery** |
| * Explain the relationship between amino acids and proteins
* Identify general processes used to build/break apart proteins
* Compare/contrast primary, secondary, tertiary, and protein structures
* Describe several causes of folding that create each of the

structures above. (hydrophobic/hydrophilic, H bonds, disulfide bridges, ions etc…)* Explain general functions of proteins (transportation,

communication, identification, immune response, controlling rates of reactions)* Explain how the function of a protein depends on its structure.
 |  |  | See website and text:* Sect. 3.10
* Page 77, Sect 4.14, 4.16
* Sect 5.4

\* Protein folding PPT on website\* Essential Study Partner: Unit: Cells Topic: Chemistry🡪 Protein |

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| **C. Demonstrates an understanding of**  **TRANSCRIPTION. *“I can . . .”*** | **Mastery Quiz Results** | **Mastery Reflection:What do I still need to master before the exam?** | **Resources for Mastery** |
| * Describe the major purpose of transcription & How this “fits” into the overall process of protein synthesis (the Central Dogma)
* Identify where transcription takes place & explain why it MUST take place there
* Contrast introns and exons
* Identify the cellular structures/organelles required for transcription and can explain their role
* Describe the role of the following in the process of
* Transcription (& Know sequence of events!!):

- mRNA, RNA Polymerase, promoter, 5’ Cap, 3’ Poly A tail, introns/exons, termination, RNA nucleotides, nucleus, DNA template * Predict effects mutations may have on the product of transcription?
* Transcribe DNA to mRNA – correctly matching complementary bases
 |  |  | See website and text for:* Sect. 8.7
* Sect 8.10

\* Essential Study Partner: Unit: Genetics Topic: Protein Synthesis🡪  Gene Activity, & TranscriptionBozeman video;<http://www.bozemanscience.com/transcription-translation>\* other docs or links <http://vcell.ndsu.edu/animations/home.htm><http://www.johnkyrk.com/> |
| **D. Demonstrates an understanding of**  **TRANSLATION. *“I can . . .”*** | **Mastery Quiz Results** | **Mastery Reflection:What do I still need to master before the exam?** | **Resources for Mastery** |
| * Describe the major purpose of translation – & How this “fits” into the overall process of protein synthesis (the Central Dogma)
* Identify the location where translation take place?
* Identify the cellular structures/organelles required

for translation and can explain their role? * Describe the role of the following in the process of
* Translation (& Know sequence of events!!):

- mRNA, tRNA, codon/anticodon, ribosome, E/P/A sites, amino acids, protein, start/stop codon* Predict effects mutations may have on the product of translation?
* Translate mRNA to a chain of amino acids using an amino acid reference table.
 |  |  | See website and text for:* Sect. 8.8
* Sect 8.9
* Sect. 4.8

\*Amino Acid Tables\* Essential Study Partner: Unit: Genetics Topic: Protein Synthesis🡪  Translation <http://vcell.ndsu.edu/animations/home.htm><http://www.johnkyrk.com/> |
| **E. Demonstrates an understanding of the**  **process of gene expression *“I can . . .”*** | **Mastery Quiz Results** | **Mastery Reflection:What do I still need to master before the exam?** | **Resources for Mastery** |
| * Explain why gene expression is important
* Describe an operon?
* Compare/contrast a promoter, repressor and activator
* Explain how a repressor protein can block the movement of RNA polymerase?
* Describe what an activator is and its importance in gene expression.
 |  |  | * Sect. 8.11

\* Essential Study Partner: Unit: Genetics Topic: Protein Synthesis🡪  Gene RegulationBozeman video:<http://www.bozemanscience.com/031-gene-regulation>\* other docs or links on website   |

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| **F. Demonstrates an understanding of mutations *“I can . . .”*** | **Mastery Quiz Results** | **Mastery Reflection:What do I still need to master before the exam?** | **Resources for Mastery** |
| * Define mutation?
* Compare/contrast mutations in germ-line tissue and mutations in somatic tissue.
* Explain the difference and effect of the following point mutations: base substitution, insertion and deletion.
* What causes frame-shift mutations? What is the usual outcome of this type of mutation?
* What is a mutagen? Give several examples.
* Be able to show the consequences of a mutation on a strand of DNA and the subsequent protein.
 |  |  | Sect. 8.12 – 8.14\* Essential Study Partner: Unit: Genetics Topic: Protein Synthesis  Translation Bozeman video:<http://www.bozemanscience.com/mutations> |