**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, &  Transcription  Bozeman 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 Regulation  Bozeman 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> |