

**MAP 2 MASTERY** Unit 4: DNA, PROTEINS, AND GENES (OH MY!!)

1. THESE ARE THE IMPORTANT CONCEPTUAL UNDERSTANDINGS I NEED TO MASTER FOR THIS UNIT:

<b>A. Demonstrates an understanding of Nucleic Acid structures and basic function</b> " I CAN... "	<b>RESOURCES THAT MAY SUPPORT MY LEARNING:</b>	<b>RESULTS/SCORES FROM LEARNING ASSESSMENTS</b>	<b>MASTERY REFLECTION: WHAT DO I STILL NEED TO MASTER BEFORE THE EXAM? (What is your strategy for <u>improvement</u>?)</b> <b>1 ON 1 : HELP</b> <b>Most effective <u>DURING</u> instruction... do not wait until the end of the unit!</b>
<ul style="list-style-type: none"> <li>* identify common structures of nucleotides (sugar, phosphate, N-base)</li> <li>* contrast purines and pyrimidines</li> <li>* identify all nitrogen base pairings</li> <li>* explain complementarity in terms of size of N-bases and the H-bonds - how is this critical to DNA structure?</li> <li>* Compare/contrast nucleotides &amp; nucleic acids</li> <li>* identify processes that build/take apart nucleic acids</li> <li>* Contrast structure and function of DNA &amp; RNA</li> <li>* identify the major function of nucleic acids &amp; explain why the order of base pairs is critical to this function</li> <li>* explain the relationship between DNA, genes, and chromosomes</li> </ul>	See Weebly/edline and text for: <ul style="list-style-type: none"> <li>• Sect. 3.11</li> <li>• Sect 8.5</li> </ul> * Essential Study Partner: <ul style="list-style-type: none"> <li>• Unit: Cells Topic: Chemistry→ Nucleic Acids</li> <li>• Unit: Genetics Topic: DNA</li> </ul> * Text Website * other docs or links on Bb	SELF ASSESSMENT(s)  MASTERY CHECK(s)	INSTRUCTOR VERIFICATION:
<b>B. Demonstrates an understanding of Protein structures &amp; general protein functions</b> " I CAN... "	<b>RESOURCES THAT MAY SUPPORT MY LEARNING:</b>	<b>RESULTS/SCORES FROM LEARNING ASSESSMENTS</b>	<b>MASTERY REFLECTION: WHAT DO I STILL NEED TO MASTER BEFORE THE EXAM? (What is your strategy for <u>improvement</u>?)</b> <b>1 ON 1 : HELP</b> <b>Most effective <u>DURING</u> instruction... do not wait until the end of the unit!</b>
<ul style="list-style-type: none"> <li>* explain the relationship between amino acids and proteins</li> <li>* identify general processes used to build/break apart proteins</li> <li>* compare/contrast primary, secondary, tertiary, and quaternary protein structures</li> <li>* Describe several causes of folding that create each of the structures above. (hydrophobic/hydrophilic, H bonds, disulfide bridges, ions etc...)</li> <li>* Explain general functions of proteins (transportation, communication, identification, immune response, controlling rates of reactions)</li> <li>* Explain how the function of a protein depends on its structure.</li> </ul>	See Weebly/edline and text: <ul style="list-style-type: none"> <li>• Sect. 3.10</li> <li>• Page 77, Sect 4.14, 4.16</li> <li>• Sect 5.4</li> </ul> * Protein folding PPT on Bb * Essential Study Partner: Unit: Cells Topic: Chemistry→ Protein * Text Website * other docs or links on Bb... <a href="http://www.chemguide.co.uk/organicprops/aminoacids/proteins.html">http://www.chemguide.co.uk/organicprops/aminoacids/proteins.html</a>	SELF ASSESSMENT(s)  MASTERY CHECK(s)	INSTRUCTOR VERIFICATION:

## THESE ARE THE IMPORTANT CONCEPTUAL UNDERSTANDINGS I NEED TO MASTER FOR THIS UNIT:

<b>C. Demonstrates an understanding of TRANSCRIPTION</b>  <i>" I CAN... "</i>	<b>RESOURCES THAT MAY SUPPORT MY LEARNING:</b>	<b>RESULTS/SCORES FROM LEARNING ASSESSMENTS</b>	<b>MASTERY REFLECTION: WHAT DO I STILL NEED TO MASTER BEFORE THE EXAM? (What is your strategy for <u>improvement</u>?)</b>  <b>1 ON 1 : Most effective <u>DURING</u> instruction... HELP do not wait until the end of the unit!</b>
<ul style="list-style-type: none"> <li>* Describe the major purpose of transcription &amp; How this "fits" into the overall process of protein synthesis (the <b>Central Dogma</b>)</li> <li>* Identify where transcription takes place &amp; explain why it <b>MUST</b> take place there</li> <li>* Contrast introns and exons</li> <li>* Identify the cellular structures/organelles required for transcription and can explain their role</li> <li>* Describe the role of the following in the process of Transcription (&amp; Know sequence of events!!):                             <ul style="list-style-type: none"> <li>- mRNA, RNA Polymerase, promoter, 5' Cap, 3' Poly A tail, introns/exons, termination, RNA nucleotides, nucleus, DNA template</li> </ul> </li> <li>* Predict effects mutations may have on the product of transcription?</li> <li>* Transcribe DNA to mRNA - correctly matching complementary bases</li> </ul>	See Weebly/edline and text for: <ul style="list-style-type: none"> <li>• Sect. 8.7</li> <li>• Sect 8.10</li> </ul> * Essential Study Partner: Unit: Genetics Topic: Protein Synthesis→ Gene Activity, & Transcription  * Text Website  * other docs or links on Bb... <a href="http://vcell.ndsu.edu/animations/home.htm">http://vcell.ndsu.edu/animations/home.htm</a>  <a href="http://www.johnkyrk.com/">http://www.johnkyrk.com/</a>	SELF ASSESSMENT(s)          MASTERY CHECK(s)	INSTRUCTOR VERIFICATION:
<b>D. Demonstrates an understanding of TRANSLATION</b>  <i>" I CAN... "</i>	<b>RESOURCES THAT MAY SUPPORT MY LEARNING:</b>	<b>RESULTS/SCORES FROM LEARNING ASSESSMENTS</b>	<b>MASTERY REFLECTION: WHAT DO I STILL NEED TO MASTER BEFORE THE EXAM? (What is your strategy for <u>improvement</u>?)</b>  <b>1 ON 1 : Most effective <u>DURING</u> instruction... HELP do not wait until the end of the unit!</b>
<ul style="list-style-type: none"> <li>* Describe the major purpose of translation - &amp; How this "fits" into the overall process of protein synthesis (the <b>Central Dogma</b>)</li> <li>* Identify the location where translation take place?</li> <li>* Identify the cellular structures/organelles required for translation and can explain their role?</li> <li>* Describe the role of the following in the process of Translation (&amp; Know sequence of events!!):                             <ul style="list-style-type: none"> <li>- mRNA, tRNA, codon/anticodon, ribosome, E/P/A sites, amino acids, protein, start/stop codon</li> </ul> </li> <li>* Predict effects mutations may have on the product of translation?</li> <li>* Translate mRNA to a chain of amino acids using an amino acid reference table.</li> </ul>	See Weebly/edline and text for: <ul style="list-style-type: none"> <li>• Sect. 8.8</li> <li>• Sect 8.9</li> <li>• Sect. 4.8</li> </ul> *Amino Acid Tables * Essential Study Partner: Unit: Genetics Topic: Protein Synthesis→ Translation  * Text Website * other docs or links on Bb... <a href="http://vcell.ndsu.edu/animations/home.htm">http://vcell.ndsu.edu/animations/home.htm</a> <a href="http://www.johnkyrk.com/">http://www.johnkyrk.com/</a> <a href="https://mywebspace.wisc.edu/jonovic/web/proteins/Proteins.swf">https://mywebspace.wisc.edu/jonovic/web/proteins/Proteins.swf</a>	SELF ASSESSMENT(s)          MASTERY CHECK(s)	INSTRUCTOR VERIFICATION:

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<b>E. Demonstrates an understanding of the process of gene expression</b>  " I CAN... "	<b>RESOURCES</b> THAT MAY SUPPORT MY LEARNING:	<b>RESULTS/SCORES</b> FROM LEARNING ASSESSMENTS	<b>MASTERY REFLECTION:</b> WHAT DO I STILL NEED TO MASTER BEFORE THE EXAM? (What is your strategy for <u>improvement</u> ?)  <b>1 ON 1 : HELP</b> : Most effective <u>DURING</u> instruction... do not wait until the end of the unit!
*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.	* G R Q 's on Bb • Sect. 8.11  * Essential Study Partner: Unit: Genetics Topic: Protein Synthesis→ Gene Regulation  * Text Website  * other docs or links on Bb...  (there are many animations linked from Bb on this topic)	SELF ASSESSMENT(s)  MASTERY CHECK(s)	INSTRUCTOR VERIFICATION:

<b>F. Demonstrates an understanding of mutations</b>  " I CAN... "	<b>RESOURCES</b> THAT MAY SUPPORT MY LEARNING:	<b>RESULTS/SCORES</b> FROM LEARNING ASSESSMENTS	<b>MASTERY REFLECTION:</b> WHAT DO I STILL NEED TO MASTER BEFORE THE EXAM? (What is your strategy for <u>improvement</u> ?)  <b>1 ON 1 : HELP</b> : Most effective <u>DURING</u> instruction... do not wait until the end of the unit!
*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  * Text Website  * other docs or links on Bb	SELF ASSESSMENT(s)  MASTERY CHECK(s)	INSTRUCTOR VERIFICATION:

# PATH 2 COLLEGE READINESS

## SCIENTIFIC SKILLS &/OR APPLICATION OF RESEARCH

<p><i>2. In order to become "college ready," I will work to master these standards during this unit (as well as throughout the course):</i></p> <p><b>" I CAN... "</b> (13 - 15) reflects level of complexity</p>	<p><b>RESOURCES</b> THAT MAY SUPPORT MY LEARNING:</p>	<p><b>RESULTS/SCORES</b> FROM LEARNING ASSESSMENTS/ LAB EXPERIENCES</p>	<p><b>MASTERY REFLECTION:</b> WHAT DO I STILL NEED TO MASTER BEFORE THE NEXT LAB/EXAM? OR the PLAN TEST, ACT, etc</p> <p><b>1 ON 1 : What is your strategy for improving your reasoning and data presentation/analysis skills?</b></p>
<ul style="list-style-type: none"> <li>• Understand the methods and tools used in a simple experiment (16-19)</li> <li>• Understand basic scientific terminology (16 - 19)</li> <li>• Find basic information in a body of text (16 - 19)</li> <li>• Determine how the value of one variable changes as the value of another variable changes in a simple data presentation (16 - 19)</li> <li>• Understand a simple experimental design (20 - 23)</li> <li>• Translate information into table or graph (20 - 23)</li> <li>• Select a simple hypothesis, prediction, or conclusion that is supported by a data presentation (20 - 23)</li> <li>• Identify the steps needed to extract DNA from any organism</li> <li>• Explain why each of the above steps is necessary for a successful extraction</li> <li>• Extract DNA from representative organism(s)</li> <li>• Analyze protein molecular data using multiple tools (PDB, JMOL etc) in order to:               <ol style="list-style-type: none"> <li>1. Locate and identify primary, secondary, tertiary, and quaternary structures of a protein</li> <li>2. Locate and identify examples of bonding (hydrogen, peptide, and sulfide bridges) that contribute to the folding and overall structure of the protein</li> <li>3. Locate active or binding sites, or the presence of a substrate</li> <li>4. Show how amino acid side chains affect the bonding and folding of a protein (polarity, hydrophobic/-phylic, presence of ions)</li> <li>5. Explain how the structure/shape of the protein is related to its function.</li> <li>6. Produce <u>computer images</u> of a protein that effectively communicates numbers 1-5 above.</li> </ol> </li> </ul>	<p>See Weebly/edline for:</p> <ul style="list-style-type: none"> <li>• documents and links posted in Course Documents and presented in class.</li> <li>• JMOL training docs and guides</li> <li>• Lab report guidelines</li> </ul>	<p>SELF ASSESSMENT(s)</p> <hr/> <p>DNA EXTRACTION LAB WRITE UP/ CONCLUSION</p> <hr/> <p>PROTEIN PROJECT (Research and creation of JMOL Images in order to analyze the structure &amp; function of a protein.)</p>	<hr/> <p>INSTRUCTOR VERIFICATION:</p>