

**BEST High School**  
*Biology/ SCI221*  
**Daniel Weiss**  
 Email: [dweiss@lwsd.org](mailto:dweiss@lwsd.org)  
 Competency-based Syllabus

## Desired Results

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Credit: .125 per session

Estimate of hours per week engaged in learning activities: 5 hours

### Course Overview:

**Instructional Materials:** - **Biology.** *Miller and Levine.* Prentice Hall. 2004. (text), online resources. Class reading handouts, science notebook, online resources. Reading materials and handouts will be posted on the class website on Communicator.

### Semester 1:

**Session 1 (9/6 – 10/4)** – Scientific Methods and Introduction to Important Molecules in Biology

**Session 2 (10/5 – 11/4)** – Ecology and Ecosystem Processes

**Session 3 (11/7 – 12/9)** – Populations

**Session 4 (12/12 – 1/27)** – Basic Cell Structure and Functions

### Semester 2:

**Session 5 (1/30 – 3/2)** - Photosynthesis and Respiration

**Session 6 (3/5 – 3/30)** – Basics of Genetics and Heredity

**Session 7 (4/9 – 5/11)** – DNA and RNA

**Session 8 (5/14 – 6/22)** – Evolution and Natural Selection

**All summative assessments are due by 1 pm two school days before the end of session**

**All coursework is aligned with the Washington State and District EALR's**

**Students earn credit for proficient completion of each session's summative assessments**

Session	Learning Target	Formative	Summative
<b>1</b>	<p>Students will understand and begin to apply the essential tools and techniques of biology and science. This means that students will be able to analyze and discuss the use of scientific method, principals of communication and collaboration in science, and scientific honesty in biology. (Biology Power Standard 11)</p> <p>Students will also learn about historic discoveries in biology and how research needs are determined. (Power Standard</p>	<p>Collect and grade science notebook with in-class and homework assignments on a regular basis.</p> <p>At the mid-point of the session have students write a self-assessment of their progress in their notebooks.</p> <p>Review Paper Airplane Lab focus on overall understanding of enzyme processes, lab procedures, and use of the scientific method.</p>	<p>Design a poster or model of a biological molecule or chemical reaction. (CANNOT BE WATER). Accurately describe its role in living things and analyze its importance to biology describe in an attached short paper (1-2 pages). Example molecules/reactions include: Carbon Dioxide, Water, various enzyme reactions.</p> <p>Give Students a List of Molecules to Chose from: NH<sub>3</sub>, NH<sub>4</sub>,</p>

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	<p>12).</p> <p>Students will understand the role of molecular and cellular structures that are essential to life. This means that students will be able to understand how the smallest particles of life (atoms and molecules) operate in living things and be able to compare and contrast the functions and roles of the common biological molecules such as protons, electrons, carbon, oxygen, water, enzymes, carbohydrates, proteins, and lipids (fats). (Biology Power Standard 1)</p>		<p>Students will include the historic significance of this molecule and be able to describe how the scientific process led to this discovery.</p>
<b>2</b>	<p>Students will understand what an ecosystem is, how living and non-living things interact in an ecosystem, and how species adapt to live in their ecosystem.</p> <p>Students will understand how matter is cycled and energy is transferred through ecosystems. (Biology Power Standard 3).</p> <p>Students will be able to apply the concepts of biodiversity and sustainable development to the stability of ecosystems (Biology Power Standard 4).</p> <p><i>EALR 1.2.1 0. Analyze how systems function including the inputs, outputs, transfers, transformations, and feedback of a system and its subsystems. This will apply directly to the interactions associated with the environment and ecosystems.</i></p> <p><i>EALR 1.3.9 Analyze the scientific evidence used to develop the theory of biological evolution and the concepts of natural selection, speciation, adaptation, and biological</i></p>	<p>Collect and grade science notebook with in-class and homework assignments. Assignments will include homework, in-class labs, and progress on the summative assessment project.</p> <p>At the mid-point of the session have students write a self-assessment of their progress in their notebooks.</p>	<p>Design a model of an ecosystem. You may recreate an existing ecosystem from anywhere in the world or create a new ecosystem of your own. You can describe your ecosystem in writing, draw a poster diagram of your ecosystem, or create a physical model. The poster and the model will require some writing component for complete descriptions of the processes.</p>

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	<p><i>diversity.</i></p> <p><i>EALR 1.3.10 Analyze the living and nonliving factors that affect organisms in ecosystems</i></p>		
<b>3</b>	<p><b>Power Standard #4:</b> Understand and evaluate the factors that affect the rate of population growth in ecosystems. <u>This means that</u> students will be able to describe and interpret that determine if a population of organisms grows or declines and whether that happens quickly or slowly.</p> <p><b>Power Standard #5:</b> Apply the concepts of population dynamics, biodiversity, and sustainable development to the stability of ecosystems. <u>This means that</u> students will be able to draw conclusions about how populations, biodiversity and sustainable development are connected to the health of an ecosystem.</p>	<p>Quiz on Population Biology – Late Nov</p> <p>Collect and grade science notebook with in-class and homework assignments. Assignments will include homework, in-class labs, and progress on the summative assessment project.</p> <p>At the mid-point of the session have students write a self-assessment of their progress in their notebooks.</p>	<p>You have been asked to prepare a presentation for the Lake Washington School Board regarding issues affecting populations, biodiversity and sustainability. They are making some district-wide changes to make all of our buildings more green and sustainable.</p> <p>You can either write a paper and prepare a clear and persuasive presentation for the class or create a persuasive PowerPoint document to aid your presentation on your topic.</p> <p>You will work alone on this project.</p> <p>In addition to the textbook and your class notes, you must use <u>at least three references</u>. You must accurately cite your references in your paper or PowerPoint presentation.</p> <p><b><u>YOU MUST PRESENT YOUR TOPIC TO THE CLASS IN ORDER TO RECEIVE A PASSING GRADE.</u></b></p>
<b>4</b>	<p><b>Power Standard #1:</b> Understand the role of complex molecular and cellular structures in essential life functions.</p> <p>This means that by the end of session 4 students will be able to:</p> <ul style="list-style-type: none"> <li>• Describe the importance of cells to life</li> <li>• Understand the connection between the history of the</li> </ul>	<p>Quiz on Cell Structure and Function</p> <p>Collect and grade science notebook with in-class and homework assignments. Assignments will include homework, in-class labs, and progress on the summative assessment project.</p> <p>At the mid-point of the session have students write a self-assessment of their progress in their notebooks.</p>	<p>Test</p> <p>Or</p> <p>Poster and Presentation on cell structure and functions. Cell membrane function may also be used. Students will summarize the entire cell and will analyze one cell organelle (or membrane) in detail.</p>

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	<p>microscope and cell discovery</p> <ul style="list-style-type: none"> <li>• Demonstrate correct use of the microscope</li> <li>• Compare and contrast the different cell organelles and their function</li> <li>• Describe the cell membrane and analyze its function</li> <li>• Distinguish the differences between passive diffusion and osmosis</li> <li>• Describe the role that enzymes play in the breakdown of food molecules</li> </ul> <p>Explain how cells extract and store energy from food molecules.</p>		
<p><b>5</b></p>	<p><b>Power Standard #1: Understand the role of complex molecular and cellular structures in essential life functions. Specifically photosynthesis and cellular respiration.</b></p> <p>This means that by the end of session 5 students will be able to:</p> <ul style="list-style-type: none"> <li>• Describe and analyze the process of photosynthesis, including the light and dark cycles and the Calvin Cycle</li> <li>• Understand the structure and function of the chloroplast in plant cells</li> <li>• Describe and analyze the process of cellular</li> </ul>	<p>Quiz on Photosynthesis</p> <p>Collect and grade science notebook with in-class and homework assignments. Assignments will include homework, in-class labs, and progress on the summative assessment project.</p> <p>Rough Draft of FLR</p>	<p>Quiz Retake</p> <p>And/Or</p> <p>Formal Lab Report.</p>

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	<p>respiration including the Krebs cycle and the electron transport chain</p> <ul style="list-style-type: none"> <li>• Describe the difference between <i>glycolysis</i> and <i>fermentation</i></li> <li>• Distinguish the differences (compare and contrast) between photosynthesis and respiration</li> </ul> <p>Write a proficient Formal Lab Report on the photosynthesis/cellular respiration lab</p>		
<b>6</b>	<p><b>Power Standard 2</b></p> <p><b>This means that by the end of session 5 students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Describe the steps of the Cell Cycle and the importance of the cycle</li> <li>• Describe the steps of Mitosis the importance of the process</li> <li>• Describe the steps of Meiosis the importance of the process in making gametes</li> <li>• The differences between Haploid and Diploid</li> <li>• Fertilization</li> </ul> <p>The basics of Genetic Theory (Gregor Mendel). This includes dominance and probability.</p>	<p>Collect and grade science notebook with in-class and homework assignments. Assignments will include homework, in-class labs, and progress on the summative assessment project.</p>	<p>You will show your knowledge of cell division and genetics by taking a test at the end of the session. You will be provided a review sheet to study from before the test and will also be allowed to fill out a 3x5 notecard for the test.</p> <p style="color: red; text-align: center;"><b>AND/OR (TBD)</b></p> <p>You will show your knowledge of cell division and genetics by choosing any outlet/format that you would like. Possible examples are poster, PowerPoint, paper, oral presentation, artistic creative outlets such as computer graphics, videos, or.....</p>
<b>7</b>	<p><b>Power Standard 2</b></p> <p><b>This means that by the end of session 7 students will be able</b></p>	<p>Collect and grade science notebook with in-class and homework assignments. Assignments will include homework, in-class labs, and</p>	<p>You will show your knowledge of DNA and RNA by taking a test at the end of the session. You will be provided a review</p>

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	<p><b>to:</b></p> <ul style="list-style-type: none"> <li>• Understand that DNA is where genetic information is stored in the cell</li> <li>• Describe the structure of DNA and illustrate how DNA is composed of four subunits (A, T, G, and C) called nucleotides.</li> <li>• Describe and illustrate the process that occurs when DNA is copied (replicated).</li> <li>• Compare and contrast the structure and function of DNA with the structure and function of RNA.</li> <li>• Construct an illustration and analyze the process of <i>Transcription</i> and <i>Translation</i> where information on DNA is read by RNA and is used to make proteins.</li> </ul>	<p>progress on the summative assessment project.</p>	<p>sheet to study from before the test and will also be allowed to fill out a 3x5 notecard for the test.</p> <p>You will show your knowledge of DNA, DNA Replication, and RNA by choosing any outlet/format that you would like. Possible examples are poster, PowerPoint, paper, oral presentation, create a game, or artistic creative outlets such as computer graphics, videos, or.....</p>
<p><b>8</b></p>	<p><b>Power Standards, 6, 7, and 8</b></p> <p><b>This means that by the end of session 8 students will be able to:</b></p> <p>Describe and provide evidence of how biological <i>evolution</i> is due to:</p> <ol style="list-style-type: none"> <li>(1) Genetic variability of offspring due to mutations and natural variation in sex cells</li> <li>(2) The potential for a species to increase its numbers,</li> <li>(3) A limited supply of</li> </ol>		<p><b>For your summative assessment for Session 8 you will have two items to compete.</b></p> <ol style="list-style-type: none"> <li>1. You will show your knowledge of Evolution and Natural Selection by taking a test at the end of the session. You will be provided a review sheet and test to study from before the test and will also be allowed to fill out a 3x5 notecard for the test. The test is on <b><u>THURSDAY JUNE 16.</u></b></li> </ol>

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	<p>resources such as food and shelter, and</p> <p>(4) Selection by the environment for those offspring better able to survive and produce offspring.</p> <p>Understand that mutations are random and while many mutations will be harmful, some may be positive and may allow the offspring to better survive and reproduce.</p> <p><i>Describe how biological classifications are based on how organisms are related, reflecting their evolutionary history. Scientists infer relationships from physiological traits, genetic information, and the ability of two organisms to produce fertile offspring.</i></p> <p>The great <i>diversity</i> of <i>organisms</i> is the result of more than 3.5 billion years of <i>evolution</i> that has filled available <i>ecosystems</i> on Earth with life forms.</p> <p>The <i>fossil</i> record and similarities observed among different <i>species</i> of living <i>organisms in different locations on earth</i> provides <i>evidence</i> of biological <i>evolution</i>.</p>		<p>2. You will show your knowledge of Evolution and Natural Selection by creating a handout, pamphlet, short book, or lesson of some kind to teach junior high level biology students about the subject. This lesson or learning material <b><u>must be in your own writing</u></b> and must be understandable by a 12-14 year old biology student in junior high.</p>
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## Types of Learning Activities

[This chart demonstrates the types of learning activities the student will complete throughout the course]

Direct Instruction	Indirect Instruction	Experiential Learning	Independent Study	Interactive Instruction
<input checked="" type="checkbox"/> _ Structured Overview <input checked="" type="checkbox"/> _ Mini presentation <input type="checkbox"/> _ Drill & Practice <input checked="" type="checkbox"/> _ Demonstrations <input type="checkbox"/> _ Other (List)	<input checked="" type="checkbox"/> _ Problem-based <input checked="" type="checkbox"/> _ Case Studies <input checked="" type="checkbox"/> _ Inquiry <input type="checkbox"/> _ Reflective Practice <input checked="" type="checkbox"/> _ Project <input checked="" type="checkbox"/> _ Paper <input checked="" type="checkbox"/> _ Concept Mapping <input type="checkbox"/> _ Other (List)	<input type="checkbox"/> _ Virt. Field Trip <input checked="" type="checkbox"/> _ Experiments <input checked="" type="checkbox"/> _ Simulations <input type="checkbox"/> _ Games <input checked="" type="checkbox"/> _ Field Observ. <input type="checkbox"/> _ Role-playing <input type="checkbox"/> _ Model Bldg. <input checked="" type="checkbox"/> _ Surveys <input type="checkbox"/> _ Other (List)	<input checked="" type="checkbox"/> _ Essays <input checked="" type="checkbox"/> _ Self-paced computer <input checked="" type="checkbox"/> _ Journals <input type="checkbox"/> _ Learning Logs <input checked="" type="checkbox"/> _ Reports <input checked="" type="checkbox"/> _ Directed Study <input checked="" type="checkbox"/> _ Research Projects <input type="checkbox"/> _ Other (List)	<input checked="" type="checkbox"/> _ Discussion <input type="checkbox"/> _ Debates <input type="checkbox"/> _ Role Playing <input type="checkbox"/> _ Panels <input type="checkbox"/> _ Peer Partner Learning <input checked="" type="checkbox"/> _ Project team <input checked="" type="checkbox"/> _ Laboratory Groups <input checked="" type="checkbox"/> _ Think, Pair, Share <input checked="" type="checkbox"/> _ Cooperative Learning <input type="checkbox"/> _ Tutorial Groups <input type="checkbox"/> _ Interviewing <input type="checkbox"/> _ Conferencing <input type="checkbox"/> _ Other (List)