

Course Title & Number: General Biology Bio121 (4 credit)

Competency Area: **SCIENTIFIC REASONING** (Goal: Students will become familiar with science as a method of inquiry. Students will develop a habit of mind that uses quantitative skills to solve problems and make informed decisions.)

Faculty submitting the Learning Outcomes: Joseph Faryniarz, Ed.D.

Date: February 11, 2013

[Instructions: Please match the Learning Outcomes in the left hand column to those of the course you are submitting for Gen Ed approval. List the corresponding course outcomes in the right hand column to indicate a match.]

BOR TAP's Learning Outcomes	Corresponding Outcomes for Course Named Above ¹
1. Explain the methods of scientific inquiry that lead to the acquisition of knowledge. Such methods include observations, testable hypotheses, logical inferences, experimental design, data acquisition, interpretation, and reproducible outcomes.	<ol style="list-style-type: none">1. Apply the scientific method to investigations and demonstrate how the process of science works.2. Demonstrate proficiency in using the following standard laboratory equipment and tools: microscopes, pH meter, spectrophotometer, laminar flow hood, micropipettes, electronic balance, gel electrophoresis apparatus, and computer interfaced-data acquisition probes with its software.3. Write meaningful laboratory reports based on the scientific method.
2. Apply scientific methods to investigate real-world phenomena, and routine and novel problems. This includes data acquisition and evaluation, and prediction.	<ol style="list-style-type: none">1. Utilize computers as a scientific tool to investigate, to collect data, to simulate experiments, to analyze scientific problems, and to present experimental results.2. Conduct experiments in bacteriology to investigate metabolism effectiveness of antibiotics, and food production.

¹ The student will be able to demonstrate proficiency of the learning outcomes by either exam, laboratory practical, laboratory report, homework, oral report, or demonstrated behavior.

	<ol style="list-style-type: none"> Investigate cellular metabolism including osmosis, photosynthesis and respiration through experimentation.
<ol style="list-style-type: none"> Represent scientific data symbolically, graphically, numerically, and verbally. 	<ol style="list-style-type: none"> Utilize computers as a scientific tool to investigate, to simulate experiments, to analyze scientific problems, and to present experimental results. Successfully conduct experiments in biotechnology including plant tissue culture and plasmid transformation, and gel electrophoresis. Write meaningful laboratory reports based on the scientific method.
<ol style="list-style-type: none"> Interpret scientific information and draw logical references from representations such as formulas, equations, graphs, tables, and schematics. 	<ol style="list-style-type: none"> Demonstrate proficiency in using the following standard laboratory equipment and tools: microscopes, pH meter, spectrophotometer, laminar flow hood, micropipettes, electronic balance, gel electrophoresis apparatus, and computer interfaced-data acquisition probes with its software. Utilize computers as a scientific tool to investigate, to simulate experiments, to analyze scientific problems, and to present experimental results. Write meaningful laboratory reports based on the scientific method.
<ol style="list-style-type: none"> Evaluate the results obtained from scientific methods for accuracy and/or reasonableness. 	<ol style="list-style-type: none"> Demonstrate proficiency in using the following standard laboratory equipment and tools: microscopes, pH meter, spectrophotometer, laminar flow hood, micropipettes, electronic balance, gel

	<p>electrophoresis apparatus, and computer interfaced-data acquisition probes with its software.</p> <p>2. Successfully conduct experiments in biotechnology including plant tissue culture and plasmid transformation, and gel electrophoresis.</p>
	<p><i>Additional Outcomes</i></p> <ol style="list-style-type: none"> 1. Carryout standard laboratory procedures such as aseptic techniques and the safe handling of various chemicals, and utilize the metric measurement system while functioning safely, productively, and independently in a biology laboratory. 2. Critically review media information to recognize the distinctions between scientific fact, misleading statements, and media sensationalism by working collaboratively in student research teams to explore a biological topic and to produce a meaningful presentation to the class and a written report. 3. Describe the basic characteristics that all life shares in common. 4. Relate how the cell is the basic unit of function and structure for all life. 5. Illustrate how the complementarity of cellular structure facilitates cellular functions. 6. Describe the chemical basis of life including atomic/molecular structure, pH, buffers, and properties of biologically important macromolecules. 7. Discuss the properties of water and their significance to life. 8. Explain how the processes of photosynthesis and respiration sustain all life on this planet and are dependent upon the Laws of

	<p>Thermodynamics and enzyme kinetics.</p> <p>9. Apply the concept of natural selection to microevolution of bacteria.</p> <p>10. Describe the characteristics of DNA, RNA, and proteins, and relate them to the Central Dogma of molecular biology.</p>
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