

Objective 2.1: Knowledge of the Liberal Arts

Course: **BIOL 100, Human Biology**

Students will possess a broad understanding of how to think about the world, having studied the modes of inquiry characteristic of humanities, mathematics, natural sciences, and social and behavioral sciences.

Outcomes 2.1-D3: Natural Scientific Mode of Inquiry (lab course)

By graduation students will:	Not Proficient 1 Point	Developing Proficiency 2 Points	Proficient 3 Points	Exceeding Proficiency 4 Points
Apply scientific methodology to a natural science question to increase understanding, make an informed decision, and/or solve a problem.	Student earns 0-60% of the points available on the end of semester laboratory report (see rubric below). Student is unable to construct a lab report using scientific methodology.	Student earns 61-75% of the points available on the end of semester laboratory report. Student has incorporated scientific methodology, but the report lacks clarity, lacks connections between the hypothesis and objectives, and may contain misinformation.	Student earns 76-90% of the points available on the end of semester laboratory report. Student has incorporated scientific methodology. Hypotheses are clear and linked to the objectives but may not be testable. Connections between hypothesis and data analysis may be weak or non-existent.	Student earns more than 90% of the points available on the end of semester laboratory report. Student has incorporated scientific methodology. Hypotheses are clear, linked to the objectives and testable. Data analysis is connected to the hypothesis.

Assignment meeting Outcome 1:

During *Laboratory Experiences in Biology*, students will use the knowledge and experience they have gained throughout the semester to design their own self-guided experiment. Students will develop their own question, and then apply scientific methodology to develop a hypothesis, and design an experiment to answer their question. The students will then perform their experiment, collect data, and analyze their results. Students will be expected to summarize their experiment and results in a written report. The criteria used to evaluate and assess the students' reports is listed below.

Category	Not Proficient	Developing Proficiency	Proficient	Exceeding Proficiency
Introduction (10 pts)	Objective unclear; no rationale given for the research. Hypotheses lacking or poorly written and not testable. (0-4 pts)	Objectives are somewhat clear; background is presented but not clear; hypotheses are adequately linked to the objective. (5-6 pts)	Objectives are clear and complete; good background that links to the objective; knowledge of research in the topic (references); hypotheses are clearly stated and address the objectives. (7-8 pts)	Objectives are clearly stated and complete; concise background/content provided; clear knowledge of previous research (references); hypothesis well-written, testable, and reflects the objectives. (9-10 pts)
Methods (10 pts)	Methods are not described; poorly described, and/or do not match hypotheses; no description of data collection. (0-4 pts)	Most of the steps of the methods are described adequately, but unclear link to hypotheses; controls and variables are not described or poorly described; data collection is poorly described. (5-6 pts)	All of the steps of the methods are described; controls and variables are properly described; data collection is described. (7-8 pts)	All of the steps of the methods are described fully and succinctly; a proper control comparison group is described, and the effect of each variable is clearly described and separated from the others; data collection is clearly described so that it could easily be repeated. (9-10 pts)
Results (10 pts)	Results are poorly presented; data does not reflect the hypotheses or methods; data are inferences; graphs/figures absent or are not complete (no title, no labels, etc.) and not referenced in the text. (0-4 pts)	Sufficient data collected; results represented and explained adequately; graphs/figures lack some clarity and may not all be referenced in the text. (5-6 pts)	Sufficient data collected and explained; graphs/figures are appropriate, clearly labeled, contain a descriptive caption and referenced in the text. (7-8 pts)	Sufficient data collected; clear and concise presentation of results; graphs/figures are appropriate, clearly labeled, contain a descriptive caption and referenced in the text; results are described with a trend clearly indicated; statistical analysis is included. (9-10 pts)

<p>Discussion (10 pts)</p>	<p>Interpretation absent or inappropriate with respect to the hypotheses. (0-4 pts)</p>	<p>Interpretation addresses original hypotheses adequately; weak or absent consideration of alternative potential interpretations; implications absent or minimally discussed. (5-6 pts)</p>	<p>Interpretation consistent with original hypotheses and well supported by the data; alternative potential interpretations are addressed; implications discussed. (7-8 pts)</p>	<p>Interpretation well-reasoned and entirely consistent with original hypotheses and well supported by the data; alternative potential interpretations are addressed; interpretation is compared to other research (citations); implications discussed. (9-10 pts)</p>
<p>Citations and References (5 pts)</p>	<p>References are missing or inadequate (Wikipedia); minimal attempt to paraphrase and cite materials properly; all sources are quotes instead of paraphrased. (0-2 pts)</p>	<p>References are used adequately (no primary/peer-reviewed sources, websites are appropriately used; all work is properly paraphrased and cited; some sources are quoted instead of paraphrased. (3 pts)</p>	<p>References are properly used with at least one primary/peer-reviewed source; all sources are properly paraphrased (not quoted) in the text. (4 pts)</p>	<p>More than one properly cited, current, and peer-reviewed literature; all sources are properly paraphrased (not quoted) in the text. (5 pts)</p>
<p>Communication and Style (5 pts)</p>	<p>Demonstrates poor communication skills; format/style guidelines not followed; obvious spelling and grammar errors (too much like texting). (0-2 pts)</p>	<p>Demonstrates adequate communication skills; format/style guidelines followed but inconsistently; spelling and grammar errors (but not like texting). (3 pts)</p>	<p>Demonstrated good communication skills; clear and well-organized; format/style guidelines followed; few spelling and grammar errors. (4 pts)</p>	<p>Demonstrates excellent communication skills; clear, concise, and well-organized; writing is grammatically correct, flows well, and is engaging; no spelling errors; format/style guidelines followed completely. (5 pts)</p>