

Learning Assessment & Evaluation

**RUBRIC: NATURAL SCIENCES**

<b>Learning Outcome:</b> Students will demonstrate both conceptual and practical understanding of the scientific methods, including abilities of hypothesis development and testing through observation or experiment, and evaluation of results; engage in laboratory or field work at a level consistent with standard college laboratory and field courses; and demonstrate the ability to work with both qualitative and quantitative information in applying scientific principle.					
<b>Competencies</b>	<b>Advanced 4</b>	<b>Proficient 3</b>	<b>Developing 2</b>	<b>Beginning 1</b>	<b>Missing 0</b>
<b>Define the question or the problem</b> <input type="checkbox"/> Clearly states <input type="checkbox"/> Identifies relevant factors (variables and constants)	Defines the problem or question in depth with detailed, clear and concise explanation of all relevant factors	Defines the problem or question and the relevant factors that influence the strategy selected	Defines the problem or question but is missing relevant factors	Defines the problem inadequately; not clearly explained or missing multiple relevant factors	Did not define the problem or question
<b>Develop a hypothesis</b> <input type="checkbox"/> Clearly states hypothesis <input type="checkbox"/> Testable hypothesis <input type="checkbox"/> Supports hypothesis with background research	Develops a hypothesis that meets all criteria and provides in depth background to support the hypothesis	Develops a hypothesis that includes all required components	Develops a hypothesis with one missing component	Develops a hypothesis with multiple missing components	Did not state a hypothesis
<b>Design experiment or study to confirm or reject the hypothesis</b>  <b>Required components:</b> <input type="checkbox"/> Tests one variable <input type="checkbox"/> Identifies constant(s) / designs control(s) <input type="checkbox"/> Creates a comprehensive	Defines experiment with detailed, clear and concise explanation of all components	Designs experiment that includes all required components	Designs experiment with one missing component	Designs an experiment with multiple missing components	Does not design an experiment

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<p>list of materials and equipment</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Provides step-by-step procedure(s) or methods</li> <li><input type="checkbox"/> Includes 3 repetitions (minimum)</li> </ul>					
<p><b>Perform the experiment or conduct the study</b></p> <p><i>Criteria:</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Follows experimental procedure(s)</li> <li><input type="checkbox"/> Records observations             <ul style="list-style-type: none"> <li>○ Designs table(s) to collect and organize data</li> <li>○ Records multiple data sets</li> <li>○ Records qualitative notes</li> </ul> </li> </ul>	<p>Performs experiment; collects data and meets all of the criteria for observation; qualitative notes are detailed and relevant to the outcome</p>	<p>Performs experiment; collects data and meets all of the criteria for observation</p>	<p>Performs experiment with error(s) OR missing a criterion for observation</p>	<p>Performs experiment with error(s) AND missing several criteria for observation</p>	<p>Did not perform experiment</p>
<p><b>Analysis of data:</b></p> <p><i>Criteria:</i></p> <ul style="list-style-type: none"> <li>• Performs Quantitative analysis</li> <li>• Performs Qualitative analysis</li> <li>• Includes charts and/or tables of results</li> </ul>	<p>Meets all criteria for analysis of data; performs extensive analysis of data with detailed charts and tables.</p>	<p>Meets all criteria for analysis of data</p>	<p>Performs data analysis with error; one chart or table is missing or inadequate</p>	<p>Performs data analysis with significant errors; several charts or tables are missing or inadequate</p>	<p>Did not perform data analysis.</p>

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<b>Evaluate Outcome</b>  <i>Criteria:</i> <ul style="list-style-type: none"><li>• Draws conclusion</li><li>• Communicate results/findings</li><li>• Supports or rejects the hypothesis</li></ul>	Meets all criteria for outcome evaluation; Communicates the results, findings and conclusion(s) in depth; provides detailed, clear and concise explanation(s) to support or reject the hypothesis	Meets all criteria for evaluation of outcome	Evaluates outcome with one criterion missing or inadequate	Evaluates outcome with several criteria missing or inadequate	Did not evaluate outcome.
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