College Science Skills / AP Science Practices

Proficiency Criteria

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|  | **Foundational Knowledge**  *Pre-requisite skills and knowledge:*  *High-school level understanding and application.* | **Target Knowledge**  *End-of-course skills and knowledge:*  *College-level understanding and application.* |
| **Science Skill / Practice** | **Level 2**  **Developing** | **Level 3**  **Mastery** |
| 1 –  Concept Explanation | 1. Summarize biological theories and concepts. 2. Compare biological processes. | 1. Explain biological theories and concepts in applied contexts. 2. Relate processes across the molecular, cellular, physiological, population, and ecosystem levels. |
| 2 –  Visual Representations & Models | 1. Describe characteristics of a biological concept, process or model represented visually. 2. Summarize key ideas and relationships depicted in a model. | 1. Explain relationships between different characteristics of biological concepts, processes, or model represented visually in theoretical and applied contexts. 2. Refine a model to better represent a data set. 3. Construct your own model. 4. Evaluate the benefits and shortcomings of a model. |
| 3 –  Questions & Methods | 1. Pose testable cause-and-effect questions. 2. Construct predictive experimental hypotheses. 3. Design controlled experiments. 4. Identify independent and dependent variables and control and experimental groups. 5. Control for extraneous variables. | 1. Identify and pose testable questions based on observations, data sets, or models. 2. Pose ethical questions related to biological phenomena. 3. Construct null hypotheses and multiple competing alternative hypotheses. 4. Design investigations to yield quantitative data that are appropriate for statistical analysis, including selecting an appropriate sample size. 5. Justify the selection of positive or negative controls. 6. Evaluate the impact of experimental errors. 7. Propose a new investigation based on evaluation of evidence from an experiment or of the design/methods. 8. Select an appropriate model organism for an investigation. |
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| **Science Skill / Practice** | **Level 2**  **Developing** | **Level 3**  **Mastery** |
| 4 –  Representing & Describing Data | 1. Construct tables, line or bar graphs, and pie charts to display data. 2. Summarize trends from a graph or table. 3. Identify specific data points. | 1. Select and justify the appropriate type of graph for a data set. 2. Describe the relationship between two variables. 3. Construct and justify the use of logarithmic, dual-Y scales, and histograms. 4. Summarize trends from non-traditional displays of data. |
| 5 –  Statistical Tests & Data Analysis | 1. Calculate means and percentages. 2. Solve problems using equations. 3. Use data to evaluate a hypothesis. | 1. Calculate and estimate rates and ratios. 2. Construct and interpret error bars representing confidence intervals. 3. Perform and interpret a chi-square test. 4. Justify the decision to reject or fail to reject a null hypothesis and to support or refute an alternative hypothesis. |
| 6 –  Argumentation | 1. State claims based on biological theories. 2. Compare data from a group of interest to a control group. 3. Predict the causes and effects of a change in a biological system. | 1. State claims that connect the underlying biology to complex cellular or ecological phenomena. 2. Provide clear and concise reasoning to justify how the evidence supports a claim. 3. Evaluate biological claims and explanations. 4. Explain the relationship between experimental results and larger biological concepts, processes, and theories. |

**Tracking My Progress**

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| **Unit** | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| **Skill 1** |  |  |  |  |  |  |  |  |
| **Skill 2** |  |  |  |  |  |  |  |  |
| **Skill 3** |  |  |  |  |  |  |  |  |
| **Skill 4** |  |  |  |  |  |  |  |  |
| **Skill 5** |  |  |  |  |  |  |  |  |
| **Skill 6** |  |  |  |  |  |  |  |  |

College & Career Work Habits

Proficiency Criteria

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|  | **Foundational Habits**  *Pre-requisite skills: high-school level application.* | **Target Habits**  *DE / AP course skills: college & career-level application.* |
| **Work Habit** | **Level 2**  **Developing** | **Level 3**  **Mastery** |
| Use of Common Resources | 1. Follow prompts for cleaning up after labs and activities. 2. Return classroom / lab supplies to the appropriate location. 3. Use resources as intended & in a conservative manner. | 1. Take an active role in independently maintaining a clean, organized workspace & reporting supplies in low quantity. 2. Research proper use of new equipment and seek guidance as needed. |
| Research & Documentation | 1. Describe the methods and findings of a research investigation. Connect your findings to larger biological questions and claims. 2. Cite sources of information that inform an investigation. | 1. Maintain a professionally formatted laboratory notebook. 2. Present original research orally & through professionally formatted written laboratory reports & scientific poster boards. 3. Reference peer-review journal articles using correctly formatted APA parenthetic citations & a references section. |
| Collaborative Problem Solving | 1. Share new ideas and possible solutions with peers. 2. Listen and respond to peer contributions. | 1. Define, divide, monitor/report progress, & complete tasks for projects. 2. Reconcile competing explanations to arrive at a consensus. 3. Share positive feedback on & suggestions for refining peer work. 4. Ensure that all members of the work group felt listened to, supported, & appreciated. |
| Contributions to Community Discussion | 1. Loudly and clearly respond to whole class peer and instructor questions. 2. Pose specific questions to request clarification on and satisfy curiosity around relevant concepts. | 1. Volunteer participation in whole-class discussion every class meeting. 2. Respond to the contributions of other participants in the class discussion. 3. Demonstrate preparedness with thoughtful responses to Daily Engage prompts. |
| Self-Directed Learning & Reflection | 1. Complete all assigned work on time. 2. Direct continuous, undivided attention towards learning during class. | 1. Self-assess areas for improvement and celebration. 2. Regularly practice explaining & applying skills and concepts on your own using a variety of challenging questions and tasks. 3. Develop & apply a method of annotating /editing assignments. 4. Seek & reference appropriate resources to support your learning. |