Living Environment/Biology
Mr. Sprague

Edward R. Murrow High School
Allen Barge, Principal

ASSESSMENT CRITERIA

SCIENCE SKILL	BEFORE THIS CLASS ***Middle School Skills to Strengthen***	DURING THIS CLASS ***High School Skills to Develop and Refine***	AFTER THIS CLASS ***For College and Beyond***
Science Skill 1 Ask Questions	• Ask cause-and-effect questions that can be tested. • Distinguish between scientific (testable) and non-scientific (non-testable) questions.	• Ask questions that draw connections between real-world observations and scientific models or theories. • Ask questions that challenge the premise of an argument, the interpretation of a data set, or the practicality of a solution. • Refine questions to make them more clear, specific, relevant, and testable given the lab and library resources available.	Professionals ask specific questions that focus more narrowly on a specific step within a complex process or about the assumptions of a complex model.
Science Skill 2 Develop and Use Models	• Summarize a diagram, drawing, graph, physical replica, diorama, or flow chart. • Explain an analogy representing a scientific concept.	• Evaluate the benefits and limitations of a model. • Refine a model to better represent a scientific concept. • Construct an original diagram, flow chart, or analogy to represent a scientific concept.	Professionals develop more complex (often more quantitative) models and compare models by testing how each one treats the same data set.
Science Skill 3 Plan and Carry Out Investigations	• Plan and conduct an experiment that produces data. • Identify independent and dependent variables and control and experimental groups. • Make predictions about the effects of changing one variable on another variable.	• Plan and conduct experiments that produce quantitative (numerical) data. • Select the appropriate laboratory equipment to collect and record data. • Design protocols to ensure that experiments are conducted in a safe, ethical manner. • Evaluate the design of an experiment for its ability to hold any variables that are not under investigation constant. • Refine the design of an experiment to make the results more reliable. • Write hypotheses that specify cause and effect using "if…then" language.	Professionals gain proficiency in a wider range of laboratory tools and techniques, develop original laboratory tools and protocols, and consider a wider range of possible hypotheses.
Science Skill 4 Analyze and Interpret Data	• Represent data in tables and graphs to visualize patterns that indicate relationships. • Compare data sets from different sources.	• Analyze data to make valid and reliable scientific claims. • Identify limitations of data analysis, such as measurement error and sample selection. • Evaluate the impact of new data on a working explanation.	Professionals apply statistical tests to carefully consider how random chance may have influenced the results of an experiment.

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Science Skill 5 Use Mathematics and Computational Thinking	• Describe when to use qualitative (descriptions) vs. quantitative (numbers) data. • Use counting and numbers to identify and describe patterns in nature.	• Explain how mathematic representations relate to scientific models or theories. • Use mathematic formulas to calculate ratios, rates, and percentages. • Estimate whether a calculated answer is reasonable.	Professionals use higher level mathematics (e.g., calculus) and digital tools (e.g., computer models) to propose and test their own original formulas and equations.
Science Skill 6 Construct Explanations	• Construct an explanation based on observations. • Describe the evidence that supports an explanation.	• Make claims about the relationship between an independent variable and a dependent variable. • Revise explanations based on new data and additional information. • Evaluate how well a data set supports an explanation or conclusion.	Professionals support their claims using multiple lines of evidence, including data collected by many other scientists.
Science Skill 7 Engage in Argument from Evidence	• Distinguish between observations and inferences. • Distinguish between arguments that are supported by evidence and arguments that are not. • Actively listen to arguments to indicate agreement or disagreement based on the evidence.	• Compare and evaluate competing arguments. • Respectfully provide constructive critiques on scientific arguments. • Thoughtfully and respectfully respond to diverse perspectives, include constructive criticism. • Determine additional information needed to resolve contradictions.	Professionals engage in a peer-review process, providing constructive criticism on the arguments from other experts in the field and responding to constructive criticism of their own arguments by other experts.
Science Skill 8 Obtain, Evaluate, and Communicate Information	• Obtain information from simple scientific texts, videos, and interactives. • Compare information in written texts to information presented in tables, graphs, and diagrams.	• Critically read news articles, popular science articles, and textbooks to determine the central ideas and conclusions. • Evaluate the validity and reliability of an information source. • Communicate scientific information and defend scientific claims in writing and through oral presentations.	Professionals write articles for scholarly publications (e.g., peer-reviewed journals) and prepare oral presentations for conferences attended by other scientists.

The BEFORE THIS CLASS column serves as the starting point for this course; these are skills that you have encountered in previous science courses and will continue to work on in this course. Upon completion of this course, you should be able to perform all the skills in the DURING THIS CLASS column.

The AFTER THIS CLASS column explains how you will build on these skills if you decide to pursue a college major and/or career in science.