

Rubric for Natural Sciences Competencies (students will become: *Critical Appraisers of Theories and the Facts that Support Them*)

Students will demonstrate the ability to:

**Adapted in part from AAC&U's VALUE Rubrics*

Competency 1 – Apply scientific methods and reasoning (C1)	use scientific reasoning to critically examine and evaluate scientific models, experimentation, and conclusions; and apply these perspectives to contemporary problems.	Subscore: _____
Competency 2 – Experiment and observe using science in practice (C2)	apply scientific principles in designing and conducting experiments, and in the evaluation, analysis, and interpretation of evidence.	Subscore: _____

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet baseline (cell 1) level performance.

<i>Scientific Method and Reasoning</i>	High Achievement 4	3	Milestones 2	Baseline 1
Critical Thinking: Scientific Reasoning (C1)	Student demonstrates critical and cogent thinking about causal relationships by clearly articulating scientific reasoning leading to causal relationships.	Student demonstrates critical and developed thinking about causal relationships by articulating how scientific reasoning leads to causal relationships.	Student demonstrates some critical thinking about causal relationships and makes a connection to scientific reasoning.	Student attempts to think critically about causal relationships, but draws inappropriate or unsubstantiated conclusions.
Critical Thinking: Analysis of Existing Work (C1)	Student assesses previous experimentation and published scientific results in order to determine current or past knowledge and to determine the possible value of continued experimentation.	Student assesses previous experimentation and published scientific results in order to determine current or past knowledge.	Student assesses previous experimentation in order to determine the value of continued experimentation.	Student relies on instruction to determine the possible value of experimentation in most contexts.
Critical Thinking: Model and/or Hypothesis Construction (C1)	Student constructs new scientific models or hypotheses, demonstrating a critical examination of existing scientific observation as well as a comprehensive understanding of scientific hypothesis and model construction.	Student constructs scientific models or hypotheses, demonstrating a critical examination of existing scientific observation as well as a basic understanding of scientific hypothesis and model construction.	Student participates in constructing scientific models or hypotheses, demonstrating some examination of existing scientific observation.	Student relies primarily on the instructor to construct scientific models and hypotheses and demonstrates little critical involvement.
Science and Society: Articulate Issues (C1)	Student articulates a variety of issues created by the complex interactions among science, technology, and society.	Student articulates some issues created by the complex interactions among science, technology, and society.	Student identifies that there are issues created by interactions among science, technology, and society.	Student demonstrates an awareness of issues created by interactions among science and society.
Science and Society: Evaluate Problems (C1)	Student uses scientific perspectives to evaluate contemporary problems facing society, identifying and assessing the problems and their underlying causes, considering the feasibility of potential solutions, and weighing their impacts.	Student uses scientific perspectives to evaluate contemporary problems facing society, identifying and assessing the problems, considering potential solutions, and weighing their impacts.	Student uses a scientific perspective to evaluate a contemporary problem facing society as well as potential solutions.	Student demonstrates an awareness of the relevance of a scientific perspective to contemporary problems, but fails to grasp how these perspectives can address them.

Science in Practice

Application (C2)	Student articulates the process of scientific reasoning and applies scientific principles inside and outside of the laboratory or field setting. Student demonstrates this application by designing and constructing experiments to make observations and test hypotheses.	Student articulates the process of scientific reasoning and applies scientific principles in the laboratory or field setting. Student demonstrates this application by constructing experiments to make observations and test hypotheses.	Student identifies instances of scientific reasoning and applies scientific principles in the laboratory or field setting. Student demonstrates this application by aiding in the construction of experiments.	Student identifies scientific reasoning somewhat reliably and engages with scientific principles in the laboratory or field setting.
Analysis/Interpretation (C2)	Student systematically evaluates evidence for accuracy, limitations, and relevance, and identifies alternative interpretations of evidence.	Student systematically evaluates evidence for accuracy and relevance, and also acknowledges the possibility of alternative interpretations of evidence.	Student evaluates evidence for accuracy and relevance, and also acknowledges the possibility of alternative interpretations of evidence.	Student evaluates evidence for accuracy, often failing to recognize the possibility of alternative interpretations of evidence.
Experimentation (C2)	Student designs and conducts an experiment to make defined observations or test a clear hypothesis within a developed theoretical framework; and accurately analyzes and interprets data using the most appropriate available quantitative and technological tools.	Student designs and conducts an experiment to make observations or test a hypothesis within a theoretical framework; and successfully analyzes and interprets data using quantitative and appropriate technological tools.	Student uses an experiment to make observations or test a hypothesis with some expectations or a theoretical framework; and analyzes and interprets data using some quantitative or appropriate technological tool.	Student uses an experiment to make observations or test a hypothesis, but without clear expectations or a robust theoretical framework; and analyzes data using some quantitative or technological tool, with only slight misinterpretations.