Scientific Ways of Knowing Rubric
General Education Skill Competency and Knowledge Objectives

Definition: A person who is competent in scientific reasoning adheres to a self-correcting system of inquiry (the scientific method) and relies on empirical evidence to describe, understand, and predict natural phenomena.

Competency and Knowledge Objectives:
To meet Scientific Ways of Knowing requirement of the general education core, courses must cover all five objectives below.

1. Apply foundational knowledge and models of a natural or physical science to analyze and/or predict phenomena.

2. Understand the scientific method and apply scientific reasoning to critically evaluate assertions.

3. Interpret and communicate scientific information via written, spoken, and/or visual representations.

4. Describe the relevance of specific scientific principles to the human experience.

5. Form and test a hypothesis in the *laboratory, classroom, or field using discipline-specific tools and techniques for data collection and/or analysis.

*Institution catalogs should display a lab requirement for one of the science courses.
| Fundamental Criteria | Exceeds End-of-Course Expectations  
Student has achieved the outcome and makes critical judgments related to relevance and application | Meets End-of-Course Expectations  
Student has achieved the outcome and consistently applies it | Entry-Level Expectation  
Student has entry-level abilities or knowledge. |
|----------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| **1. Foundational Knowledge:**  
Apply foundational knowledge and models of a natural or physical science to analyze and/or predict phenomena. | Demonstrates detailed understanding of the facts and theoretical models of a traditional natural or physical science, and employs this to correctly pose and answer questions related to the analysis and prediction of phenomena. | Demonstrates knowledge of the facts and theoretical models of a traditional natural or physical science, and can use this information to correctly solve problems and describe phenomena. | Possesses rudimentary awareness of the bounds and subject matter of a specific natural or physical science, and has basic reasoning skills required for analytical problem solving. |
| **2. Scientific Method and Reasoning:**  
Understand the scientific method and apply scientific reasoning to critically evaluate assertions. | Demonstrates thorough understanding of all steps of the scientific method, and applies this knowledge to critically evaluate the strengths and weaknesses of scientific assertions. | Demonstrates sound grasp of the scientific method and correctly applies scientific reasoning to assess the validity of assertions. | Is acquainted with the basic outline of the steps composing the scientific method, and aware of the role of evidence in scientific reasoning. |
| **3. Scientific Communication:**  
Interpret and communicate scientific information via | Clearly conveys scientific data, reasoning, and conclusions through written, verbal, and | Demonstrates ability to accurately convey and receive scientific information through | Has been introduced to graphical presentations of information and basic scientific |
| Fundamental Criteria | Exceeds End-of-Course Expectations  
*Student has achieved the outcome and makes critical judgments related to relevance and application* | Meets End-of-Course Expectations  
*Student has achieved the outcome and consistently applies it* | Entry-Level Expectation  
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<td>written, spoken, and/or visual representations.</td>
<td>graphical presentations. Correctly gathers similar information from figures, technical writing, and spoken communication.</td>
<td>words and pictures.</td>
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<td><strong>4. Relate to Human Experience:</strong> Describe the relevance of specific scientific principles to the human experience.</td>
<td>Can use specific scientific principles to predict events within the real-world, everyday experience of the student, and predict outcomes or make judgements related to broader societal issues.</td>
<td>Can explain how specific scientific principles describe events within the real-world, everyday experience of the student, or inform understanding of broader societal issues.</td>
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<td><strong>5. Hypothesis Testing:</strong> Form and test a hypothesis in the laboratory using discipline-specific tools and techniques for data collection and/or analysis.</td>
<td>Independently formulates a hypothesis. Designs and executes an experiment to confirm or refute it. Assesses the quality of the experimental results and draws appropriate conclusions.</td>
<td>Formulates a hypothesis in response to a problem or prompt. Executes an experiment and analyzes data that specifically addresses hypothesis. Draws conclusions based on data.</td>
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