A1. Knowledge Outcomes Rubric, STEM Disciplines

Definition

STEM – Science, Technology, Engineering and Math – courses are intended to advance competency in the use of scientific and mathematical thinking to understand the world and solve problems.

Framing Language

The STEM disciplines cover many fields and the rubric is intended to be general enough to apply to a range of approaches and assignments to achieve the ***STEM Student Learning Outcome: Understand and apply theories and methods of the science, technology, engineering, and mathematical (STEM) disciplines.***

The foundation of the rubric is Bloom's Taxonomy (https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/). Bloom's Taxonomy, proposed by Benjamin Bloom in 1956 and revised in 2001, is a classification of the different outcomes and skills that educators set for their students (learning outcomes). There are six levels (remembering, understanding, applying, analyzing, evaluating and creating) that are hierarchical, meaning learning at higher levels depends on knowledge and skills at lower levels. However, it may not be practical to always start with lower order skills and step through the entire taxonomy for each course concept. For example, 100 and 200 level courses may target lower-order Bloom's skills because students are building foundational knowledge. 300 and 400 level courses, where students have a solid foundation in terminology and processes, may target higher-order learning objectives. For more information see https://tips.uark.edu/using-blooms-taxonomy/

How to use this rubric:

Students may meet the STEM Learning Outcome either through a collection of unique student work over the course term, or a series of exercises and assignments as part of a longer or more complex project. A collection of work could contain a wide variety of different types of work and might include, for example: research papers, article summaries, laboratory reports, or exams. The requirements could be met in assignments for a lecture class, laboratory class or recitation section.

URI Knowledge Outcomes Rubric – STEM Disciplines

- For “full” designation, courses must address any 5 elements.
- For “partial” designation, courses address any 3 of the elements.

Elements	Competent	Approaches Competency	Beginning Competency
1. Recalls factual information For example, vocabulary, definitions, facts, terms, concepts, people, etc.	Identifies all of the relevant factual information	Identifies some of the relevant factual information	Identifies minimal to no relevant factual information
2. Understands factual information For example, compares, describes, explains, discusses, classifies information, etc.	Demonstrates thorough understanding of the factual information	Demonstrates partial understanding of the factual information	Demonstrates minimal to no understanding of the factual information
3. Applies concepts to address a task For example, solves problems, presents or performs, uses abstract ideas, etc.	Applies relevant concepts with accuracy and thoroughness to completely address the task/assignment.	Applies some but not all relevant concepts to address the task/assignment OR there are some errors in applying concepts when addressing the task/assignment.	Applies few if any relevant concepts to address the task/assignment OR concepts are incorrectly/inaccurately applied.

4. Analyzes and interprets information For example, data may be organized and interpreted with statistics, or artistic work may be interpreted through historical knowledge, etc.	Provides a thorough analysis and interpretation of the information.	Provides some analysis and/or some interpretation of the information.	Provides minimal to no analysis or interpretation of the information.
5. Evaluates claims using criteria and standards For example, evaluates a hypothesis, argues a point of view, persuades an audience, critiques strengths/weaknesses, evaluates different artistic forms or techniques, etc.	Evaluates claims to support a position using clearly defined criteria and standards.	Evaluates claims to support a position using ill-defined criteria and standards.	Evaluates claims to support a position without clear criteria and standards, or no evaluation is evident.
6. Demonstrates innovative and creative thinking creates a product. For example, develops/designs an original plan, report, product, performance, etc.	Demonstrates innovation, creative thinking and/or creative risk-taking in producing something original when addressing the task/assignment.	Demonstrates some innovation, creative thinking and/or creative risk-taking when addressing the task/assignment.	Demonstrates minimal to no innovation, creative thinking and/or creative risk-taking when addressing the task/assignment.