General Education Outcomes
Coconino Community College has identified four categories of general education outcomes comprising knowledge, skills, and perspectives which it seeks to instill in its graduates. These are listed below with illustrative, but not exhaustive, descriptions and examples.

1.) Communication Skills- Conveying of ideas using one or more methods of expression (written, oral, signed)
a.) Plan, construct, and present logical, coherent, well-supported arguments with consideration of target audience.
1. Demonstrate the skills necessary to conduct scientific investigation

b.) Communicate clearly and effectively, orally and in writing, at a college-level.

c.) Demonstrate listening and comprehension skills for effective communications.

d.) Use appropriate technology for communication and information gathering.

2.) Thinking Skills– Using a variety of inquiry methods, resources, and reasoning skills that support and promote lifelong learning.

a.) Formulate vital questions and problems in a clear and precise manner.
3. Demonstrate critical thinking and deductive reasoning

b.) Gather, assess, and interpret information within a theoretical framework.
1. Demonstrate the skills necessary to conduct scientific investigation
c.) Develop well-reasoned conclusions and solutions to problems.
3. Demonstrate critical thinking and deductive reasoning.

d.) Recognize and assess the assumptions, implications, and consequences of different theoretical frameworks.
1. Demonstrate the skills necessary to conduct scientific investigation
3. Demonstrate critical thinking and deductive reasoning.

3.) Diversity and Global Awareness- An understanding and appreciation of diverse cultures, values, beliefs, and historical perspectives
a.) Analyze the complexity of humanity and its significance for the individual and for society.

b.) Describe the interaction between individuals, their culture, and the physical environment.
2. Demonstrate scientific literacy

c.) Evaluate the continuity of events/issues over time.
2. Demonstrate scientific literacy.

4.) Ethical and Civil Values- A better understanding of oneself and others in order to clarify individual and societal responsibilities, needs, and values

a.) Recognize the consequences and significance of one's actions.

b.) Understand the values of one's society and the implications of those values.

Science Outcomes	Measures
1. Demonstrate the skills necessary to conduct scientific investigation.	1.Equipment; use, recognition, safety 2. Design and test experiments 3. Data collection 4. Numerical literacy
2. Demonstrate scientific literacy.	1. Terminology 2. Concepts 3. Correlations 4. Evaluate 5. Historical perspective 6. Nature of science
3. Demonstrate critical thinking and deductive reasoning.	1. Evaluate information 2. Research skills 3. Analyze data/info 4. Technical interpretation (competency)
4. Demonstrate the ability to communicate effectively.	1. Represent knowledge in multiple ways. 2. Logical format

Rubric for Assessment of Science Skills and Outcomes. (From Bryan) - **DRAFT**

Outcome 1: Demonstrate technical skills relevant to conducting scientific investigations.

Objective A: Technical measurement

Accurate, repeatable, appropriate

Computational Analysis (number crunching correctly)

Outcome | concept | application

1) Measurement had correct numeric value

2) Measure had correct significant figures, if appropriate.

3) Measure had the correct units

4) Dimensional analysis was correctly applied

Objective D Organization of information.

1) Tables:

Title stated subject matter.

Dimensions were stated horizontally (across the top of the table).

Iterations or species were stated vertically.

Correct units were designated in columns

Information was neat and legible.

2) Graphs.

Axes were correctly labeled.

Axes were correctly scaled

Data were neatly plotted.

Legend correctly portrayed, if necessary.

Caption expressed “Y axis as function of X axis in experiment scenario”.

Interpretation succinctly described data trend.

3) Lab report

Follows standard science writing format.

Each section contained the necessary information.

Sections had extraneous or irrelevant information.

Conclusions were data based.

Outcome 2: Scientific Literacy

Objective A: Terminology

Identifies meaning of terms.

Uses appropriate term in evaluation tool.

Does not define a term by using the same term.

Can differentiate between synonyms, antonyms and homonyms of a term.

Can deduce the meaning of a term from its written context.

Objective B: Concepts

Clearly expresses a given concept.

Applies correct concept to a situational context.

Can discern concept from analogous &/or illustrative situation.

Can apply concept in inductive &/or deductive reasoning

Objective D: Relevance of science concepts in society.

Identifies examples of “good science” vs. “bad science”.

Able to read and understand a newspaper article on science.

Given a scenario, can propose reasonable action based on science principles.

Can identify science concepts which may be helpful in solving a science - social related problem.

Can distinguish between technology and science.

Can identify costs and benefits of a proposed “scientifically based solution” to an articulated problem currently faced or created by human society.

Outcome 3: Critical Thinking and deductive reasoning. My notes indicate we choose to skip this outcome at this time.

Outcome 4: The ability to communicate effectively:

Objective A: Clearly articulate ideas

Student writes with complete sentences.

Sentences express a singular, complete idea

Paragraphs are directed.

Paragraphs express coherent idea.

Objective B: Deliver logical arguments

Logical argument: is easy to follow

Uses appropriate data

Supported by appropriate data

Comes to a clear conclusion

Alternate interpretations of data are stated.

Objective C: Represent concepts in various ways.

Written

Posters

Power Points

Abstracts

Graphs

Oral presentations

Other modality deemed appropriate by instructor

Use of a gradation of proficiency – general enough to apply to all gen ed science classes

Examples:

Critical thinking rubric

Emerging	Developing	Mastery

MAPPS

Not Proficient	Marginal	Proficient

Need to have a descriptor of what each level means, not just averages

Example 1:

From General Education Assessment Plan Report

MAPPS reading level 1 and 2, Math level I, II, III

Example 2 : Liberal Sciences Critical Thinking Rubric