Student Learning Outcomes/Objectives, with Any Associations and Related Measures, Targets, Findings, and Action Plans

**SLO 1: empirical and quantitative skills**
Students will effectively apply empirical concepts to scientific evidence presented in graphic form.

**Relevant Associations:**

- **Standard Associations**
  - New Core Component Areas
    - 2 Life & Physical Science (L & PS)
    - 9.2 CAO Life & Physical Sciences
  - New Core Objectives
    - 3 Empirical & Quantitative Skills (EQS)

- **General Education/Core Curriculum Associations**
  - 2 Quantitative Thinking: Students will demonstrate mastery of quantitative reasoning and algorithms used to address applied problems

**Related Measures**

**M 4: empirical and quantitative**
To assess applications of scientific and mathematical concepts, students will be asked to demonstrate knowledge of the discipline through the use of five embedded questions in a multiple-choice exam. Questions would be similar to the following:

According to the graph provided (not included here in WEAVE), what is the United Nations medium projection for the global human population in 2050?

a. 4 billion  
b. 9 billion (correct answer)  
c. 10 billion  
d. 25 billion

Source of Evidence: Standardized test of subject matter knowledge

**Target:**
Students will average at least 65% correct on the five embedded multiple-choice questions. This percentage is based on previous assessment activities in a 2000-level non-majors science course.

**SLO 2: critical thinking skills**
Students will analyse, evaluate, and synthesize scientific evidence to draw conclusions.

**Relevant Associations:**

- **Standard Associations**
  - New Core Component Areas
    - 2 Life & Physical Science (L & PS)
    - 9.2 CAO Life & Physical Sciences
  - New Core Objectives
    - 1 Critical Thinking (CT)

- **General Education/Core Curriculum Associations**
  - 1 Critical Thinking: Students will apply critical thinking appropriately to identify, analyze and resolve complex issues.

**Related Measures**

**M 3: critical thinking**
To assess analysis, evaluation, and synthesis of information, students will be asked to apply knowledge of the discipline to solve novel problems in the form of five embedded questions in a multiple-choice exam. Questions would be similar to the following:

Atmospheric concentrations of CO2 are related to net primary production (NPP), which varies seasonally in temperate climates. During the growing season, concentrations of atmospheric CO2 would be expected to _____.

a. remain relatively stable  
b. increase  
c. decrease (correct answer)  
d. significantly but randomly fluctuate

Source of Evidence: Standardized test of subject matter knowledge
Target:
Students will average at least 65% correct on the five embedded multiple-choice questions. This percentage is based on previous assessment activities in a 2000-level non-majors science course.

SLO 3: Communication
In a group context, students will complete a science related activity and explain orally the process used to complete the activity.

Relevant Associations:

- Standard Associations
  - New Core Component Areas
    - 2 Life & Physical Science (L & PS)
    - 9.2 CAO Life & Physical Sciences
  - New Core Objectives
    - 2 Communication (COM)

- General Education/Core Curriculum Associations
  - 3 Communication: Students will develop written and oral presentations that are clear, precise, organized, efficient and appropriately adapted to audience and purpose.

Related Measures

**M 2: communication**
To assess the ability to effectively communicate scientific concepts and results, students will work in groups during breakout sessions in class on an activity on carbon emissions and carbon offsets. They will work cooperatively to complete the activity and to help all group members to understand the material. Each group will be asked to explain the process used to complete the activity when they are done. The following evaluation tool will be used to assess communication.

A. Were students able to learn cooperatively in a group?
   1. Students were unable to learn cooperatively, and finished class with little comprehension of the material.
   2. Students were somewhat able to learn cooperatively, but only one of the group members seemed to understand the material.
   3. Students were able to learn cooperatively, and all group members seemed to understand the material.
   4. Students were able to learn cooperatively, and all group members had a firm understanding of the material.

B. Were the students able to adequately explain the process they were completing?
   1. Students were unable to explain the process.
   2. Students were somewhat able to explain the process, but needed a significant amount of prompting from the instructor.
   3. Students were able to explain the process, but needed some prompting from the instructor.
   4. Students were able to explain the process correctly with no prompting.

Source of Evidence: Project, either individual or group

Target:
Student groups will score an average of 3 on the evaluation rubric. This represents adequate work.

SLO 4: Teamwork
Students will work effectively in groups to achieve a shared goal.

Relevant Associations:

- Standard Associations
  - New Core Component Areas
    - 2 Life & Physical Science (L & PS)
    - 9.2 CAO Life & Physical Sciences
  - New Core Objectives
    - 4 Teamwork (TW)

- General Education/Core Curriculum Associations
  - 4 Teamwork: includes the ability to collaborate effectively, consider different points of view, and work with others to support a shared purpose or goals.

Related Measures

**M 1: teamwork**
To assess the ability to work effectively with others to support a shared goal, students will work in groups during breakout sessions in class on an activity on carbon emissions and carbon offsets. They will work cooperatively to complete the exercise and to help all group members understand the material. Each group will be asked to explain the process used to complete the activity when they are done. The following evaluation tool will be used to assess teamwork.

A. Were students able to stay on task?
   1. The students were unable to stay on task.
   2. Students stayed on task somewhat, but were often distracted and not working on the assignment.
   3. Students stayed on task, but did occasionally get distracted.
   4. Students stayed on task, and completed the assignment without distraction.

B. Were students able to cooperate to complete the assignment?
1. Students were unable to complete the assignment.
2. Students completed the assignment, but with many errors and a lot of assistance.
3. Students completed the assignment with few errors and little assistance.
4. Students completed the assignment correctly.

C. Were students able to learn cooperatively in a group?

1. Students were unable to learn cooperatively, and finished class with little comprehension of the material.
2. Students were somewhat able to learn cooperatively, but only one of the group members seemed to understand the material.
3. Students were able to learn cooperatively, and all group members seemed to understand the material.
4. Students were able to learn cooperatively, and all group members had a firm understanding of the material.

Source of Evidence: Project, either individual or group

**Target:**

Student groups will score an average of 3 on the evaluation rubric. This represents adequate work.