# General Education Course Proposal Guidelines
# Natural and Physical Sciences Discipline Area

Approved by FHSU General Education Committee 6 April 2023

## Outcomes:

1. Make appropriate use of models based on well-established scientific reasoning to predict or explain natural phenomena.
2. Evaluate the validity or strength of a truth-claim or scenario using scientific reasoning or methods.
3. Collect, analyze, and interpret observational data using scientific methods and reasoning.

## KBOR General Education Framework:

The Kansas Board of Regents identifies a Natural and Physical Sciences Discipline Area that must be included in the General Education program of each Regents institution. Students are required to take one science theory course and one science laboratory course.

## Assessment Examples:

It is expected that most science courses will be able to identify assignments or exam questions that they are already using in the course to assess these outcomes. Outcomes 1 and 2 are to assess theory courses.

**Outcome 1** identifies a common thread among all science courses. Students are taught a scientific theory or framework and are asked to make a prediction or explain an observation. Examples of questions that could be given as a standalone quiz, or as part of a larger exam:

1. Given a map of tectonic plate boundaries, identify regions where we would expect to find mountain ranges, volcanoes, and other geological features or events.
2. A cannonball is launched from the ledge of a 10 m cliff with a muzzle velocity of 10 m/s parallel to the ground. Determine when the cannon ball would strike the ground below, where it would strike the ground, and how fast it would be traveling when it strikes the ground.
3. If you see the full moon rising in the east, what time of day is it? Explain.

**Outcome 2** asks students to use what they have learned about a scientific theory or framework and apply it to some claim or (possibly fictional) scenario. Examples of questions:

1. An electric car company has announced that they have made a breakthrough in battery technology. They have found a way to make smaller batteries more efficient and the result is a light car that can travel a greater distance on one charge. The company claims that they were able to drive their 1000 kg electric car to the top of Pikes Peak from its base, an ascent of 4300 m, and only use half the charge of the battery's 50 kWhr battery. Should we buy stock in this company? Explain.

2. It has recently been discovered that the rotation of Earth's inner core has slowed. This is the likely cause of climate change since the Industrial Revolution. Evaluate the strength of this claim.

**Outcome 3** is to assess lab courses. Students are expected to learn how to collect observational data and perform some analysis with the data they collected. Collecting data could include collecting physical specimens from the wild, viewing a set of supplied specimens under a microscope and noting various properties, constructing an experiment and taking measurements, or even gathering data from public databases to perform some analysis.