

UGEC Criteria for Natural Sciences Core

The primary goal of the required science core is to expose students to the particular critical thinking methods that are characteristic of scientific reasoning and discovery, and to the disciplines of natural science. Though students will not become expert scientists through such courses alone, the main subject matter of the course is still science as it is actually practiced by scientists, so that students may be informed citizens and consumers who recognize the appropriate roles of science in their worldview.

The natural sciences are astronomy, biology, chemistry, earth science, and physics. A course satisfying the natural science core requirement must draw substantively from these areas. Petitions for course approval from departments outside these disciplines should be accompanied with a letter of support from the appropriate department.

Below we give three specific criteria, all of which are expected of any course that may count toward the natural sciences core. This is in addition to the specific designations above.

1. Promotes Quantitative Literacy Through Analysis of Empirical Evidence

Science advances through observation or experiment, carefully designed to eliminate bias and test hypotheses.

- a. Students analyze data in various forms, with an emphasis on graphical data analysis, and evaluate the appropriateness of data to answer a particular question.
- b. Students identify what evidence might be required to assess a given hypothesis, how to revise such a hypothesis in light of empirical results, and to decide what additional observations might be needed.
- c. Students integrate inductive methods and experimental procedures. A central experiential component of the course is the demonstration of laboratory practices and methods applicable to the development of analytic procedures that reinforce the students' mathematical competence.

2. Results Applied Within a Larger Framework

Science consists not only of the accumulation of isolated data and hypotheses, but of interpreting any new information within a larger body of scientific knowledge.

- a. Students address the linkage of science with other aspects of contemporary society, with specific focus on a technological, historical, or ethical issue that rests on a body of scientific understanding.
- b. Students evaluate relationships between different disciplines, and within a single discipline, by using the natural sciences as a basis for building and testing theories.

- c. Students apply scientific thinking, by identifying questions outside the natural sciences where a scientific viewpoint may be essential to understanding an issue or dilemma and propose practical methods for solving such problems.

3. Promotes Critical Thinking Through Evaluation

Science evolves as a process of evaluating evidence, articulating arguments, justifying conclusions, and identifying and presenting multiple perspectives.

- a. Students evaluate a proposed scientific explanation, and critique not just its practice of science but also whether scientific reasoning is appropriate to a particular question.
- b. Students are exposed not only to the major theories of a discipline, but assess the extent to which experiments and empirical evidence modify those theories.