GE Standard V: Scientific Standard

Courses seeking to meet the Scientific Standard must:

(i) Require students to engage in particular activities, and
(ii) Use direct assessment to demonstrate improvement of student skills in particular areas

To meet the Standard, courses must address *each* of the first three areas below (Areas 1, 2, and 3), and must address *one of* the last two areas (either Area 4 or Area 5). Direct assessment must be used in *each* of the four areas chosen.

The specific requirements for addressing and assessing each Area follow, and are listed under the Area headings themselves. One page is devoted to each of the five Areas.

Area 1: Understanding Science as a Process

Briefly describe contexts in which your course will require students to do one or more of the things listed in the following bullet point:

- Recognize how areas of research are identified, how research problems are defined, and how research programs are designed to test hypotheses.

Your course is asked to demonstrate improvement in one or more of the following student skills:

- The ability to describe key features that distinguish the scientific process from non-scientific ones
- The ability to describe the process by which science is used to answer questions
- The understanding that science relies upon observations of the physical universe, and that all scientific ideas are provisional
- The ability to distinguish questions that may be addressed scientifically from those that cannot be so addressed

Describe what direct assessments you will use in order to demonstrate improvement of such skills among your students.

Area 2: Scientific Knowledge

Briefly describe contexts in which your course will require students to do one or more of the things listed in the following bullet point:

- Explore and discuss major concepts, theories, historical milestones, and contemporary methods in at least one scientific discipline.

Your course is asked to demonstrate improvement in one or more of the following student skills:

- The understanding of major contemporary concepts in at least one scientific discipline
- The ability to describe key theories in at least one scientific discipline
- The ability to describe critical steps in the historical development of contemporary concepts or theories in at least one scientific discipline
- The ability to describe specific methods by which scientists in a particular scientific discipline collect empirical data

Describe what direct assessments you will use in order to demonstrate improvement of such skills among your students.

Area 3: Communicating Scientific Ideas

Briefly describe contexts in which your course will require students to do the following:

- Effectively communicate the results of scientific investigations in a format appropriate to the task.

Your course is asked to demonstrate improvement in one or more of the following student skills:

- The ability to effectively communicate scientific ideas
- The ability to defend and/or criticize conclusions drawn from scientific data by using the data itself
- The ability to communicate the assumptions, approximations, uncertainties, and limits of applicability inherent in a given scientific analysis

Describe what direct assessments you will use in order to demonstrate improvement of such skills among your students.

Area 4: Participation in the Scientific Process

Briefly describe contexts in which your course will require students to do one or more of the things listed in the following bullet point:

- Collect scientific data using appropriate tools and techniques, analyze and evaluate scientific data, and use scientific data to formulate and/or test scientific hypotheses.

Your course is asked to demonstrate improvement in one or more of the following student skills:

- The ability to collect, analyze, or evaluate scientific data
- The understanding of the sources of uncertainty in empirical data, and the ability to estimate the sizes of such uncertainties
- The ability to formulate hypotheses based upon observational data
- The ability to determine ways by which scientific hypotheses might appropriately be tested

Describe what direct assessments you will use in order to demonstrate improvement of such skills among your students.

Area 5: Science and Society

Briefly describe contexts in which your course will require students to do the following:

- Explore and discuss the impacts, potential or realized, of scientific research on society

Your course is asked to demonstrate improvement in one or more of the following student skills:

- The ability to identify societal problems for which the application of science could be beneficial, and the ability to discuss cogently ways in which science could be of benefit in such cases
- The ability to evaluate scientific information relevant to contemporary issues, the ability to identify the sources of such information, and the ability to assess the credibility of such information
- The ability to describe how scientific inquiry can contribute in meaningful ways to political, social, economic, or ethical discussions
- The ability to use scientific reasoning to make informed, data-driven decisions on contemporary issues that require scientific literacy

Describe what direct assessments you will use in order to demonstrate improvement of such skills among your students.