GER 2 -- The Natural Sciences

Proposed Revisions

The fundamental requirement of GER 2 courses is that they introduce students to the enduring scientific principles that underlie many of the important issues of their times and foster an appreciation of how science relates to our wider culture. Because these issues can change over the course of a lifetime, students must be given a foundation that prepares them to further educate themselves. Such a preparation provides the student with:

1. a body of knowledge within a particular scientific discipline; and
2. an appreciation of the broader context for that knowledge.

Although both criteria must be satisfied by a GER 2 course, there is no fixed formula for determining the exact percentage of time to be spent on each. The two criteria are elaborated as follows:

Criterion 1: A body of knowledge within a particular scientific discipline.

Gaining a scientific body of knowledge involves the mastery of concepts and the development of the viewpoint specific to a particular scientific discipline. It is more than simply learning a set of facts. Knowledge of a particular science and its paradigms allows understanding of:

A. What types of questions should be posed and how one can go about answering them;
B. How scientific theories are developed and tested; and
C. The nature of empirical knowledge and the limits of science.

Criterion 2: An appreciation of the broader context for that knowledge.

GER 2 courses also address issues that go beyond the body of knowledge of a particular discipline, such as the concepts that unify the natural sciences or how science has related to the broader cultural context. All GER 2 courses achieve an understanding of at least three of the following:

A. The character of natural laws;
B. The role of mathematics in science;
C. The centrality of cause and effect reasoning to the scientific world view;
D. The fundamental importance of change and evolution;
E. The characteristic scales and proportions of natural phenomenon;
F. The historical development of science and its cultural and intellectual context.

The laboratory component of combined lecture/laboratory courses, or separate laboratory courses which have GER 2 lecture courses as co-requisites, should introduce students to the conduct of experiments and observations, and the analysis of resulting data. Student

understanding of experimental design and troubleshooting should be encouraged. To insure a proper balance between these aspects of laboratory inquiry, it is the committee's philosophy that the laboratory must include a significant component of "hands-on" experience. Activities such as the use of supplied data for analysis, the discussion of classical experiments, the use of computer simulations or demonstrations by instructors may all have appropriate roles as components of the laboratory experience. However, in the aggregate, they should not constitute the bulk of that experience

Current Criteria

The fundamental requirement of GER 2 courses is that they introduce students to the enduring scientific principles which underlie many of the important issues of their times, and foster an appreciation of how science relates to our wider culture. Because these issues can change over the course of a lifetime, students must be given a foundation which prepares them to further educate themselves. Such a preparation requires providing the student not only with factual information but also with:

- 1. an appreciation of the nature of scientific inquiry and understanding, and
- 2. an understanding of the concepts that unify the natural sciences.

Although both criteria must be satisfied by a GER 2 course, there is no fixed formula for determining the exact percentage of time to be spent on each. The two criteria can be elaborated as follows:

Criterion 1: Appreciating the nature of scientific inquiry and understanding involves having a basic conception of the following:

- a. how scientific theories are developed and tested
- b. the nature of empirical knowledge and the limits of science; and
- c. the historical development of science and its wider cultural and intellectual context.

Criterion 2: Understanding the concepts that unify the natural sciences involves having a basic conception of at least three of the following:

- a. the character of natural laws;
- b. the role of mathematics in science;
- c. the centrality of cause and effect reasoning to the scientific world view;
- d. the fundamental importance of change and evolution; or
- e. the characteristic scales and proportions of natural phenomenon.

The laboratory component of combined lecture/laboratory courses, or separate laboratory courses which have GER 2 lecture courses as co-requisites, should introduce students to

the conduct of experiments and observations, and the analysis of resulting data. To insure a proper balance between these aspects of laboratory inquiry, it is the committee's philosophy that the laboratory must include a significant component of "hands-on" experience. Activities such as the use of supplied data for analysis, the discussion of classical experiments, the use of computer simulations or demonstrations by instructors may all have appropriate roles as components of the laboratory experience. However, in the aggregate, they should not constitute the bulk of that experience.