

Mathematical and Scientific Understanding

Learning Goal: Mathematics and science courses that are part of the core curriculum will develop quantitative, observational, and problem solving abilities of students. In addition to gaining an understanding of content and methodologies, students will examine mathematics and science as a creative endeavor. They will also consider the social and ethical issues of scientific inquiry and application.

Mathematics Learning Outcomes: Students will

1. Apply abstract and logical reasoning to identify patterns and solve mathematical problems; and
2. Communicate mathematical ideas and concepts accurately and clearly using mathematical symbols, language, and formulas.

Scientific Learning Outcomes: Students will

1. Demonstrate an understanding of scientific concepts, principles, and theories that explain the natural and physical world; and
2. Collect, analyze, and interpret empirical data gathered in a laboratory or field setting; and
3. Examine social or ethical issues that arise in the process of scientific inquiry or out of scientific or technological developments.

Rationale (i.e., the intention of the proposed outcomes): While Mathematical and Scientific Understanding are included in the same learning goal, they constitute two distinct ways of knowing. Thus, we have divided the outcomes. "Science" is the practice of gathering data about the natural/physical world, formulating hypotheses about how the world works based on that data, testing and revising and inductively arguing one's way forward. "Mathematics", on the other hand, assumes the validity of certain premises and argues deductively from them.

Mathematics Outcomes: Outcome #1 is written to be intentionally broad, to include both pure and applied mathematics. Outcome #2 is about student's ability to communicate their knowledge in this area.

Science Outcomes: Outcome #1 makes clear that by *science* we intend students to be able to understand the way of knowing constitutive of the natural and physical sciences, rather than one of the many other disciplines that uses the term science (e.g., the social sciences). The areas of the natural and physical world that it may address should be understood broadly (e.g., physics, chemistry, biology, neuroscience, anatomy). Outcome #2 uses the phrase laboratory or field setting in order to make it clear that lab should be understood in the broadest possible way. Outcome #3 intends that students have demonstrated some understanding of one or more of the social and/or ethical issues that occur within or result from developments in modern science.