

Quantitative Reasoning

What is Quantitative Reasoning? QR is a set of abilities for recognizing, evaluating, and using forms of quantitative information in order to support a position or argument. It includes the ability to express quantitative information mathematically, graphically, orally, and in writing. It involves problem solving, especially with problems derived from actual data. Although it is not the same as mathematics or statistics, it may include aspects of both, as well as aspects of information literacy.

The QR subcommittee recommends

- * As a first choice, a separate QR goal should be adopted within general education, and a QR course requirement (roughly parallel to the communication goals and course requirement) should be adopted.
- * As a second choice, QR could be included with specific language, perhaps drawn from this document, within the critical thinking goal. In that case, we recommend that the QR course requirement still be adopted.

TEXT FOR STUDENTS AND THE PUBLIC

Sample Goal Wording: Quantitative Reasoning. Students will be able to find, understand, and use relevant quantitative information within a meaningful context.

Rationale: We are increasingly surrounded by quantitative information. Using that information appropriately is a foundation for further learning, as well as for personal and professional growth.

You will improve your quantitative reasoning when your ES courses ask you to practice the following:

- * apply empirical data to a specific problem or issue;
- * draw conclusions based on quantitative information;
- * analyze graphical information and use it to solve problems.

TEXT FOR FACULTY VALIDATING/REVALIDATING QR COURSES

Philosophy: Courses qualifying for a QR designation include quantitative thinking as a core component of the course. QR courses, by design, are integrative and include both quantitative concepts and contexts (or examples) that root the quantitative work within a disciplinary context. They are planned to provide students with experience in finding, understanding, and using relevant quantitative information within a meaningful context. Through these courses, students gain experience in understanding, constructing, and critiquing quantitative arguments

Pedagogy: These courses are by their nature centered around making sense of and communicating about quantitative ideas, which means that students need opportunities for first-hand experience with data. Courses qualifying as QR are expected to include appropriate practice, for individual students and for groups of students, in finding and using quantitative

information in context. Quantitative data and conclusions should be communicated mathematically, visually, orally, and in writing, and students should be able to translate from one form to another. Students are expected to use basic computational skills, but the focus of a QR course is on thinking about using quantitative information in context rather than on the computation itself. Class size for a QR course is capped at 50 students, making it possible for faculty to incorporate the kinds of active learning that are expected.

Course Content: Any course designated as QR must include elements related to reasoning, chance, arithmetic/basic algebra, and data analysis/interpretation. QR courses will often also include elements related to statistics and modeling. Some QR courses may contain elements related to computers.

Pre-requisites: Because QR courses ask students to do significant intellectual work involving the elements listed above, they should not be mistaken for courses in basic math or computation. Students should bring these mathematical/computational skills into the QR course, which means the courses will have a pre-requisite of Math 103 (or an ACT score, AP/CLEP score, placement test score, or transfer credit acceptable to the Math Department for Math 103 equivalency).

Assessment/Grading: Quantitative reasoning must be a significant element in the course, as demonstrated by its importance in assessment and grading. Generally, quantitative reasoning skills should contribute to 30% or more of the grade in the course, and the teacher should analyze student learning related to quantitative reasoning as part of his or her assessment of learning in the course. As such, assessment of student learning in relation to the QR content will be an essential component of revalidation.

Designation as a QR Course: Courses must be approved by the General Education Committee for designation as a QR course. In order to receive that designation, an application must be submitted which demonstrates that the course meets stipulations related to content, methods, and assessment/grading. The stipulations are summarized below:

1. The course provides practice, for individual students and groups of students, in finding and using quantitative information in context.
2. The course includes practice with communicating quantitative data. Data may be communicated mathematically, visually, orally, and in writing, as well as translated among the various forms.
3. The course includes content related to reasoning, chance, arithmetic/basic algebra, and data analysis/interpretation. The course may contain other elements, including but not limited to modeling, statistical interpretation, and use of computers as a quantitative reasoning tool.
4. The importance of quantitative reasoning within the course should be reflected in the grade; it should contribute to 30% or more of the grade for the course. In addition, the teacher regularly analyzes student learning related to quantitative reasoning as part of his/her assessment of the course for Gen Ed revalidation and as part of a process for improving teaching and learning.
5. Course size does not exceed 50 students, unless there is a satisfactory explanation of how necessary practice and feedback can be provided within the larger group (e.g., with systematic use of TAs).

During validation or revalidation of a QR course, a copy of the course syllabus should be submitted to document these requirements. Where the syllabus does not fully demonstrate satisfaction of the criterion, the teacher should submit explanatory notes.