Mathematics and Quantitative Reasoning Course Development Guidelines

Description
The Mathematics and Quantitative Reasoning requirement provides a basis for students to develop skills in mathematical and quantitative thinking, especially as those skills apply to issues arising in everyday life. This requirement assumes three full years of college preparatory mathematics (including problem solving skills) as the basis for exploring data and its use in media, business and daily life. The course will be 4 credits total encompassing the equivalence of 3 hours of lecture and 1 hour of recitation. This course is required for every student unless able to demonstrate that they have met the Minimum Learning Outcomes elsewhere in their curriculum, subject to approval by the UB Curriculum Office.

Aims and Objectives

- Develop the mathematical and quantitative reasoning skills required by students in all fields of study, in order to analyze and interpret data, graphs, and models, as may be required for educated men and women in today’s society.
- Synthesize quantitative information from different sources, to understand the accuracy of the information and the limitations of conclusions drawn from it.
- Interpret quantitative information and express inferences and conclusions in writing.

Minimum Learning Outcomes

Having completed the Math and Quantitative Reasoning course, students will be able to employ quantitative methods, mathematical models and statistical analysis, to develop well-reasoned arguments about, and to solve, real world problems, beyond the level of basic algebra. More specifically, after completing this course students will be able to:

- Analyze data and apply empirical or theoretical methods to guide decision-making.
- Interpret mathematical models, formulas, graphs, and tables, and draw inferences from them.
- Choose appropriate models for a given problem, using information from observed or deduced data and knowledge of the system being studied.
- Employ quantitative methods, mathematical models and/or statistics to develop well-reasoned arguments to identify and solve real world problems beyond the level of basic algebra, while also being able to recognize the limitations of mathematics and statistics.
- Recognize common mistakes in empirical and deductive reasoning, and mathematical and quantitative problem solving.
- Express inferences and conclusions in writing.

Comments
For many students in STEM and the social sciences, the Math and Quantitative Reasoning learning outcomes will be met by courses required for the major. For other students, courses will need to be developed, or existing courses revised in order to meet the learning outcomes described. Existing courses may need to be modified to include recitation or lab, or course materials updated in light of the prerequisite requirement of 3 full years of high school mathematics, including high school courses in algebra. There appears to be a particular need for courses satisfying the Math and Quantitative Reasoning learning outcomes among arts and humanities majors who will not satisfy the requirement through their major. Examples of topics that may be appropriate for this requirement include decision-making in personal finance and in health care, randomness in data, correlation and causation, extrapolation and interpolation, statistical paradoxes, and the application of numeracy to debates in current affairs.