Proposed Plans
Mathematics/Quantitative Reasoning Requirement
University of Massachusetts Boston
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Alternative Ways to fulfill the Mathematics/Quantitative Reasoning Requirement

All students who enter the University as freshmen or as transfer students with fewer than 30 credits (or equivalent competencies) would in their first year at UMass Boston, need to demonstrate competence in mathematics/quantitative reasoning by any of the following methods:

A. Achieving a designated minimum score on an Advanced Placement or CLEP examination.

B. Placing into Math 129, Math 130 or higher on University assessment tests (which most likely will be revised to include a section on quantitative reasoning topics), or in CPCS scoring sufficiently high on a college achievement test.

C. Completing the new course being proposed in College Algebra by the Mathematics and Computer Science Department (if approved), or Math 124 or higher, or in CPCS the statistics competency.

D. Completing an approved quantitative reasoning course (or equivalent competencies in the College of Public and Community Service) fulfilling the goals described below.

E. Transferring in a course equivalent to or higher than those in C and D above.

On the basis of University assessment testing, students may require additional work in mathematics/quantitative reasoning, prior to taking the courses listed in C or D above, and hence may need two or more semesters to complete this requirement.

QR Courses or Competency

The quantitative reasoning (QR) requirement places stress on reasoning, instead of on mathematical manipulation and computation. QR entails analyzing quantitative information to make decisions, judgements, and predictions. It involves defining problems by means of numerical, symbolic, and visual representations of real-world phenomena, determining how to solve them, deducing consequences, formulating alternatives, and predicting outcomes. These courses should motivate and enable students to use quantitative reasoning skills throughout their personal, academic, and professional lives. These courses should not be terminal, but should be designed to feed naturally into other courses in general education and in a variety of disciplines. Faculty from across all disciplines and not just mathematics are encouraged to develop courses and/or competencies that meet the same basic goals listed below.

Goals of QR Courses or Competency

Students will develop and demonstrate the capacity to:

1) Recognize and pose real world problems involving the use and/or collection of data.
2) Understand and critique quantitative arguments about real world problems:

    a) identify the ideas and arguments put forward in a variety of original readings (at a level of a New York Times article) chosen preferably from multiple sources and disciplines and from multiple perspectives.

b) recognize and analyze bias in readings/arguments.

c) evaluate the quality of data and their sources and recognize the limitations of quantitative arguments.

3) Formulate and communicate quantitative arguments and frameworks for decision making.

4) Use all four of the standard modes of quantitative representations and be able to make connections among them:

oral/written
numerical
visual
symbolic

5) Generalize and apply QR strategies to topics outside the course.

Content of QR Courses or Competency

The following content areas are mandatory:

1) Study and apply the two most basic mathematical models: linear and exponential.

2) Include a discussion of descriptive statistical issues as needed for dealing with the types of arguments/ data displays that will appear in the popular press, e.g. mean, median, and mode; bar graphs and time series.

3) Consider applications in social sciences, physical and life sciences, or arts and humanities.

The following content areas are optional:

1) Risk assessment

2) Additional topics in statistics, e.g. percentiles, types of distributions

3) Probability

4) Mathematical models, e.g. best fit functions

5) Logic of simple arguments

6) Notions of proportionality

7) Estimation of answers, including very large and very small numbers

8) Effects of scale

Suggested Approaches for QR Courses or Competency

Faculty are encouraged to incorporate some combination of the following:

Significant data sets

Working in pairs or groups

Technology

In-depth projects, not just short problems

Case studies

Oral/written presentations

A variety of means of assessment

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