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## Old Dominion University

### Assessment Plan for Quantitative Reasoning

#### Definition of Competency:

The [mission](#) and goals of Old Dominion University require that **“every Old Dominion undergraduate student follow a general education program that is designed to develop the intellectual skills of critical thinking and problem solving and to encompass the breadth of understanding needed for personal growth and achievement and for responsible citizenship.”**

In addition, Objective 1.3 of the [Old Dominion University Strategic Plan: 2000-05](#), states that the University will “continue to offer a high-quality general education curriculum to all undergraduate degree-seeking students and assess the general education program for quality and effectiveness . . . by monitor[ing] the general education requirements implemented in 1998 to review their effectiveness.”

Finally, one of the goals of Old Dominion University’s [General Education Program](#) is to “develop basic mathematical competence.” Basic mathematical competence requires competence in quantitative reasoning. Competency in Quantitative Reasoning is defined by the following five skills and abilities that will be assessed across the three primary courses designed to meet this General Education requirement.

1. Logical Reasoning
2. Computational Skills
3. Data Interpretation
4. Problem Solving
5. Quantitative modeling

#### Standards for Competency:

1. Logical Reasoning: Students will be able to interpret sentences that contain the logical connectives “and,” “or,” “some,” “all,” and “none”. They will be able to use deductive reasoning to draw conclusions from a series of statements and to identify appropriate generalizations or trends.
2. Computational Skills: Students will develop facility in the language and symbols of mathematics and will be able to perform basic calculations and operations related to the application of mathematics or statistics.
3. Data Interpretation: Students will be able to read and interpret visual displays of quantitative information such as bar graphs, line graphs, pie charts, pictographs, and tables. They will be able to use them to make predictions and draw inferences from the data.
4. Problem Solving: Students will be able to read a word problem, set up the necessary equations that describe the problem, solve these equations using basic quantitative techniques, and interpret or draw a conclusion from the solution.
5. Quantitative Modeling: Students will be able to model physical and natural phenomena and assess validity of a model, make predictions from the model, and draw conclusions based on the model.

### Description of Methodology Used to Gather Evidence of Competency:

Assessment data will be collected from 20 multiple-choice questions that will serve as part of the final exams in three courses that satisfy the University's General Education Requirement in Mathematics. The three courses are (a) MATH 102, College Algebra; (b) MATH 162, Precalculus; and (c) STAT 130, Elementary Statistics. There will be a different set of 20 questions for each course to reflect the content of that course. However, on each final exam, each of the five quantitative reasoning competencies will be examined by four multiple-choice questions. The multiple-choice format will facilitate easy tabulation and impartial assessment.

High competence in quantitative reasoning will be indicated by scores ranging from 17 – 20 correct answers (85 – 100%) and satisfactory competence will be indicated by scores of 12 – 16 correct answers (60 – 80%). In addition, students must demonstrate competence in each area by correctly answering 2 of the 4 items in that area and passing the course. Scores from 0 – 11 indicate that the student has not shown adequate competency in quantitative reasoning. In addition, those who do not pass the course will be assumed to be less than competent in quantitative reasoning and thus will not be counted as part of the sample. They will be counted in a future sample when they successfully complete the course.

The exams will be developed for pilot testing in 2002-2003 with full implementation in 2003-2004. Preliminary pilot test data will be reported in May 2003 and data from the completed tests reported in May 2004.

### Summary: (75 words) (Provide brief analysis of results)

	<b>MATH 102</b>	<b>MATH 162</b>	<b>STAT 130</b>	<b>Total</b>
N, % high	346 / 47%	115 / 24%	107 / 19%	568 / 32%
N, % satisfactory	307 / 42%	253 / 53%	200 / 35%	760 / 43%
N, % unacceptable	81 / 11%	113 / 23%	257 / 46%	451 / 25%

Overall, 75% of the students who passed their general education math course were found to have at least a satisfactory level of quantitative reasoning competence. This varied across courses with 89% of the students in College Algebra and 77% of those in Precalculus demonstrating higher levels of competence while only 54% of the students in Elementary Statistics achieved competence. Faculty have started discussions about how to improve the performance of their students. Requiring more homework and attendance are a couple of the suggestions expressed early in the discussion. Faculty also plan to review the item analyses and fine-tune the tests as well.