

Quantitative Reasoning (2/20/2007) [Revised 3/9/2007] and Prerequisites

Background

At our October retreat we left unsettled the question of what structure the QR requirement would take, particularly related to the prerequisites students should have prior to enrolling in QR classes. Below we outline the various options for a QR requirement, from the most to least rigorous, along with suggestions as to how a pre-requisite might be handled and potential resource and programmatic effects.

QR Options

Option 1.0 [Recommended Form]

- Require students to demonstrate they have the equivalent of Math 102 (Intermediate Algebra) either by ACT Score, Math Placement Testing, or taking Math102 to remedy their deficiency. [Math 102 is essentially high school algebra II.]
- Require students to take a Foundational QR/QL course, Math 103 (College Algebra), Math 115 (Introduction to Mathematical Thought), or a new Introduction to Quantitative Literacy course. Or, take a freshman/sophomore course validated for this level of QR/QL. High School Algebra II or Math 102 would be a prerequisite for a Foundational QR/QL course.
- Require students to take an upper level QR/QL course, preferably in their major(s) or in another program as approved by their major department(s). A Foundational QR/QL course would be a prerequisite.

Option 0.5 [Original QR Subcommittee Form]

- Require students to demonstrate they have the equivalent of introductory college level mathematics by ACT Score, AP credit, Transfer credit, Math Placement Testing or taking a college level mathematics course (Math 103: College Algebra or higher).
- Require students to take an upper (or advanced) level QR/QL course with the equivalent of Math 103 as a prerequisite. Thirty percent, or more, of the course would be QR/QL related.

Option 0.25 [Minimal Form]

- Require students to demonstrate they have the equivalent of High School Algebra II by ACT Score, AP credit, Transfer credit, Math Placement Testing, or taking Math 102 (Intermediate Algebra). Offer remediation in QR/QL if necessary.
- Require students to take a course validated for QR/QL, preferably in their major, or as approved by their major department. Prerequisite would include High School Algebra or equivalent. Thirty percent, or more, of the course would involve QR/QL.

QR Prerequisites

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 that such a course must have a mathematics prerequisite. The Mathematics department currently offers several courses at an introductory college level: Math 103: *College Algebra*, Math 107: *Pre-Calculus*, and Math 115: *Introduction to Mathematical Thought*. The department is considering adapting one or more of these, as well as Math 146: *Applied Calculus II*, toward more of an application and modeling approach. This change alone would provide appropriate college level background for a Quantitative Reasoning course. Additionally, the department would be willing to explicitly include in our curriculum discussions designing these courses so as to satisfy the needed prerequisite for Quantitative Reasoning courses across campus.

Prerequisite Option A:

Require students to demonstrate they have the equivalent of introductory college level mathematics by ACT Score, AP credit, Transfer credit acceptable to the Mathematics department, Math Placement Testing or taking a college level mathematics course (Math 103: *College Algebra*, Math 107: *Pre-Calculus*, Math 115: *Introduction to Mathematical Reasoning*, or higher).

- ACT Math scores of 26 or higher place students beyond entry level college mathematics. Over the last five years 30.54% of incoming freshmen attain these ACT Math scores. Those students would be verified as satisfying the QR prerequisite.
- ACT Math scores between 22 and 25 place students in an introductory college level mathematics course. This range of scores was attained by 32.13% of incoming freshmen. The Mathematics Department Placement Test Program (Math Alg or TEF tests) is offered to these students. Those students scoring at least 10 out of 30 on the PTP or at least 13 on the TEF are placed beyond introductory level mathematics, hence would also satisfy the Quantitative Reasoning prerequisite. For students not meeting the basic QR prerequisite a college level mathematics course that provides the fundamentals of quantitative reasoning would be required (Math 103, Math 107, Math 115, or a new course). Such a course could apply to the SBHE *Mathematics, Science and Technology* required credit hours.
- Students attaining an ACT Math score of 21 or below, 37.33% over the last five years, are placed in remediation. Further testing through the Math PTP reduces the number of students who need remediation to approximately 10-12% of the incoming freshmen. Such students would need to take either the remedial courses Math 102: *Intermediate Algebra* or Math 100: *Refresher Math*. This would continue to be necessary under this option.

Resources

- Under this option, no significant effect on advanced level course resources since the QR component could be incorporated into existing class offerings. In some cases, class size might need to be reduced if we maintain a cap on class size.
- The Math PTP is administered through the Getting Started Program in Summers and by the Mathematics department during the academic year. Additional resources may be required to administer, score and document the test(s) and results, but not much more than
- **A Fundamentals of Quantitative Reasoning** course could consist of a redesigned Math 103 (College Algebra) or Math 115 (Introduction to Mathematical Reasoning) courses.

This may require additional resources since such a course should be taught in sections of no more than 25 students in order to accomplish the learning goals, and because such a course makes heavy demands on instructors. This would require two new GTA lines.

- The GTAs used to teach such a course, they would need additional mentoring and supervision as well as some time to acclimate to teaching the course. Currently the Mathematics department Associate Chair supervises, oversees, mentors, trains and assesses the GTA's teaching. The mentoring and training of GTAs to teach the Fundamentals of Quantitative Reasoning courses may need to be transferred to a Director of Freshman Mathematics, most likely one of our Senior Lecturers. This may require hiring an additional Lecturer, at least at part-time.

Prerequisite Option B:

Require students to demonstrate they have the equivalent of high school level mathematics by ACT Score, AP credit, Transfer credit acceptable to the Mathematics department, Math Placement Testing or taking a remedial mathematics course (Math 102: Intermediate Algebra)..

- ACT Math scores of 22 or higher place students beyond high school level mathematics. Over the last five years 62.67% of incoming freshmen attain these ACT Math scores. Those students would be verified as satisfying the minimal QR prerequisite.
- Students attaining an ACT Math score of 21 or below, 37.33% over the last five years, are placed in remediation. Further testing through the Math PTP reduces the number of students who need remediation to approximately 10-12% of the incoming freshmen. Such students would need to take either the remedial courses Math 102: *Intermediate Algebra* or Math 100: *Refresher Math*. This would continue to be necessary under this option with a revised Math 102 course to serve as an re-introduction to quantitative reasoning at the high school level. This course would, as is currently true, not satisfy graduation, general education and some full-time status financial aid requirements, nor the SBHE *Mathematics, Science and Technology* required credit hours.

Resources

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- The Math PTP is administered through the Getting Started Program in Summers and by the Mathematics department during the academic year. Additional resources may be required to administer, score and document the test(s) and results, but not much more than
- **An Introduction to Quantitative Reasoning** course could consist of a redesigned Math 102 (Intermediate Algebra) courses. This may require additional resources since such a course should be taught in sections of no more than 25 students in order to accomplish the desired learning goals, and because such a course makes heavy demands on instructors. This would require two new GTA lines.
- The GTAs used to teach such a course, they would need additional mentoring and supervision as well as some time to acclimate to teaching the course. Currently the Mathematics department Associate Chair supervises, oversees, mentors, trains and assesses the GTA's teaching. The mentoring and training of GTAs to teach the Introduction to Quantitative Reasoning courses may need to be transferred to a Director of Freshman Mathematics, most likely one of our Senior Lecturers. This may require hiring an additional Lecturer, at least at part-time.