The Quantitative Reasoning Working Group (QRWG) at UH Mānoa was formed in February 2014 to ensure that the required undergraduate curriculum offers students sufficient opportunities to develop quantitative reasoning (QR) skills and therefore be able to meet UH Mānoa’s standard of performance in this area. The QRWG was established by the request of the Mānoa Faculty Senate Executive Committee, the General Education Committee, Foundations Board, and the Vice Chancellor for Academic Affairs.

Fall 2014 Members:
Robert Bachini, Director of Undergraduate Programs, Business
Lorraine Baron, Assistant Professor, Mathematics Education
Dawne Bost, Educational Specialist, General Education Office
Joy Logan, Professor, Spanish and Latin American & Iberian Studies
Miguel Felipe, Assistant Professor, Music
Michael Nassir, Instructor, Physics & Astronomy [co-chair]
Scott Rowland, Specialist, Geology & Geophysics
Todd Sammons, Associate Professor, English; Faculty Administrator, General Education Office
Monica Stitt-Bergh, Associate Specialist, Assessment Office [co-chair]

We have created the following FAQ sheet to provide additional information in regards to the draft QR definition and draft QR hallmarks (November 2014) and to invite further input.

**FAQs — November 2014**

1. **Why quantitative reasoning?**
   Students’ quantitative reasoning (QR) skills have been an ongoing concern of UH Mānoa faculty for several years. Furthermore, the need for graduates with adequate QR skills has been recently confirmed by external organizations such as the Western Association for Schools and Colleges (WASC), which accredits the Mānoa campus. While the QRWG’s formation was initially prompted by WASC’s changed requirement regarding QR, this is not the QRWG’s sole concern. The QRWG is motivated by the desire to create useful QR experiences for Mānoa’s undergraduates, ensuring that they graduate from UH Mānoa with a sufficient level of competence and a relevant set of skills in QR.

   At this time, we seek constructive comments on the draft definition and draft hallmarks (November 2014).

2. **Where did the list of student skills (draft hallmark #3, items A-F) come from?**
   The list is based on the dimensions in the Quantitative Literacy VALUE rubric that was developed by teams of faculty experts representing colleges and universities across the United States. The rubric provides performance descriptors for many of the items listed in draft hallmark #3.
3. **Are there existing courses that satisfy the draft QR Hallmarks?**
   Yes. For example, we believe that MATH 140 (Precalculus) and MATH 241 (Calculus I) satisfy the draft Hallmarks. There are likely many other courses that satisfy the draft Hallmarks, perhaps with only minimal changes. (See also the implementation section below.)

4. **Will the QR course be limited to 30 students?**
The QRWG believes that a 30-to-1 student to faculty ratio will allow faculty (including graduate teaching assistants) to give adequate individual feedback. However, the QRWG recognizes that fiscal constraints may prevent an enrollment maximum from being implemented. Thus we are investigating models and options (e.g., a lecture plus recitation section led by a teaching assistant).

5. **Some of the QR examples appear to use only high-school-level mathematics.** Will QR courses be at the college level?
   Yes. The quantitative reasoning courses will require students to apply mathematical tools to complex professional and daily-life scenarios. An analogy is literature: students read the same novel in high school and college. In college, the novel is re-analyzed using advanced tools of literary criticism and student’s understanding of the work’s themes and context is informed by other college courses and post-secondary life experience.

**Planning the Implementation of QR**

_Prefatory note: Questions of implementation are being researched and considered by the QR Working Group._ Our final recommendations to the Mānoa Faculty Senate may include multiple pathways to implementation with accompanying analysis. Regardless of final implementation, we believe that QR is valuable at all levels of a modern college education, from introductory courses through advanced courses within majors. We encourage all departments to include QR throughout their curricula.

6. **What factors will the QRWG consider when it develops implementation plans?**
   As we create implementation plans, our guiding principles include the following:
   a) ensure that UH Mānoa undergraduates, regardless of major, have sufficient opportunities to develop QR skills;
   b) meet WASC accreditation requirements; and
   c) allow students to be able to graduate in four years/120 credits by not adding to the existing requirements and building mechanisms for seamless transfer.

7. **Will the QRWG recommend that QR become a requirement?**
   Yes. We are motivated by the belief that QR is analogous to written communication literacy as a vital aspect of a modern college education. We are investigating the benefits of different models, including but not limited to, QR as a single Foundations course requirement and QR as a graduation requirement such as a Focus requirement. Regardless of the final form, we are committed to working with UH campuses to ensure smooth transfer and no delay in time to degree. We anticipate a transition period of several years.

8. **Will QR replace the FS (Foundations Symbolic Reasoning) requirement?**
   Possibly. We are considering this option because (a) we are sensitive to the ramifications of creating a new requirement and (b) we know that there is substantial overlap between FS and QR.
If QR replaces FS we will recommend a FS sunset period of several years. This will allow
departments/campuses time to modify their courses and allow grandfathered students time to
complete their FS requirement.

9. If QR becomes a Foundations requirement, will it need the System Foundations Board’s approval?
No. However we acknowledge that a change in Foundations requirements at Mānoa will have an
effect on the systemwide committee on Foundations. Thus we will work with faculty on the
systemwide committee and at all UH campuses to have simple, efficient student and course transfer
procedures.

UH Hilo and Hawai‘i Community College already have a quantitative reasoning requirement. Maui
College is working on a quantitative reasoning requirement. Because WASC requirements state that
campuses need to demonstrate student competency in QR, we encourage all campuses (both 4-year
and 2-year) to examine whether their current core/graduation requirements are adequately
preparing all students in this area.

10. Will students be allowed to “place out” of the QR requirement?
Yes, if the QR requirement is implemented at the introductory level. Although we encourage all UH
Mānoa students to challenge themselves and expand their education with at least one QR course
that is above the level of their previously completed coursework, we recognize that strong students
enter Mānoa well equipped with these skills. These students should be allowed to place out of an
introductory-level QR requirement.

We have yet to investigate various placement options and their validity. Possible options include
SAT score, ACT score, Advanced Placement exam score, or Mānoa QR placement test score (a test
administered in a manner similar to the Math Department’s Placement Exam).

11. Will transfer students be eligible to satisfy the QR requirement with transfer courses?
Yes. We will recommend a transition period of several years while we work with other campuses
and units to determine which mechanism(s) of articulation is simple and seamless. Within-system
transfer will depend on how QR is implemented (see the existing transfer student and inter-campus
articulation agreement). For example, UH Mānoa has pro-rated the requirements for some Focus
requirements: students who transfer with 56 credits take fewer Focus courses. If QR is a
Foundations requirement, students who take an equivalent course at another campus will have
satisfied the UH Mānoa requirement (approved transfer courses are listed in the UH System
Transfer Credit Database). In addition, if QR is a Foundations requirement, campuses can discuss
whether a common Foundations programs articulation model is beneficial.

Thank you.

Visit our website: http://manoa.hawaii.edu/quantitativereasoning

Send comments and feedback to qrwg.hawaii@gmail.com
We also note that the UH community colleges' accrediting body, the WASC Accrediting Commission for Community and Junior Colleges, states the institution's programs include quantitative competency. See page 6, Standard II.A.11 Accreditation Standards for the Accrediting Commission for Community and Junior Colleges, http://www.accjc.org/wp-content/uploads/2014/07/Accreditation_Standards_Adopted_June_2014.pdf

2 High school graduation and admission to UH Mānoa require passing grades in Algebra I, Geometry, and Algebra II, but they do not require Trigonometry or Pre-Calculus. (The SAT Mathematics portion uses primarily Algebra I and Geometry, with occasional basic Algebra II.) College-level mathematics traditionally includes topics beyond Algebra II — namely Trigonometry, Pre-Calculus, Calculus or Applied Calculus, and Statistics. All existing courses within the UH System that solely review Algebra I and Geometry skills are numbered below 100 and hence are not eligible for credit toward undergraduate degrees. Courses that solely review Algebra II skills are sometimes numbered above 100, but typically have restrictions such as CR/NC grading or fewer than 3 credit-hours, and hence cannot satisfy core/graduation requirements (example: UH Mānoa MATH 134).

3 The governing document for the systemwide committee on Foundations can be found in Executive Policy E5.209; the details are explained in the May 20, 2004 memo on pages 18-21. Minutes and other documents are available online: http://www.hawaii.edu/offices/app/aa/foundations.html

4 Executive Policy E5.209 governs the articulation of courses and includes the systemwide committee on Foundations agreement.