Science and Math Liaison Meeting

Feb. 7, 2017

Agenda (first page), Minutes (second page), Divisional Learning Goals (third page)

Divisional learning goals. Process for getting SM division to formally adopt divisional learning goals (and determining what this means). How does this get translated into the website/catalog, ensuring implementation in classes? Longer term: adding a third learning goal for computational/mathematical reasoning or figuring out what to do with Q (and Econ, Logic)

Divisional lunch on faculty-student research. In previous meetings we have identified some of the issues with faculty-student research, particularly during the summer. We have shared this document with the division, Anne Harris, Carrie Klaus, Susan Anthony for FDC, and Dan Gurnon for SRF, who have been invited to the meeting on Monday, Feb. 20 from 11:30-12:30. Lunch will be provided. How do we want to structure the meeting? (Need to make sure we also address this issue in other curricular areas)

Changing SM gen ed requirement.

--Strategy (e.g., reaching out to faculty in other curricular areas for support and maybe changing their requirements? Not waiting for Curriculum Committee, but keeping them in the loop on our “grassroots” effort)

--What is the change we want? 2 SM, at least one with a lab? 3 SM classes? .25 credit for students taking labs (but that impacts # credits in the major)?

 --Providing rationale (students are NOT utilizing their “agency” in a very wise way and opting out of lab courses for gen ed and courses in other curricular areas; grant(s) for course and curricular revision; labs potentially provide a more active, engaging, hands-on learning experience for students; we are working on revising labs to make many of them more inquiry-based)

 --Examples of what these labs look like (greater social relevancy, more active)

 --More long-term: increasing the number of credits required for graduation because of for-credit WT and May Term

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Minutes

Present: Steven Bogaerts, Dana Dudle, Mary Kertzman, Pam Propsom, Jackie Roberts, Fred Soster, Brian Wright

Divisional lunch on faculty-student research.

How do we want to structure the meeting? Perhaps start by listing the issues already identified (we don’t want this to turn into a complaining session and start generating even more concerns). Kate Knaul will also be there (she is involved in seeking money for research). Also will invite Corinne Wagner to attend. (Need to make sure we also address this issue in other curricular areas.)

Divisional learning goals.

The goals as they stand do not really include Math (Statistics, but probably not Calculus). Steven suggested that the goals don’t really relate to introductory CS course either. The goals are so closely linked to Q that it seems difficult to address without broadening the discussion. Is Q across the curriculum really happening now? Most Q courses are in SM. One proposal was to require students to pick whether they count a course for SM or Q, but can’t double-dip; there is precedent now with PPD, in which students have choose how to count the course (although this is for distribution requirements and not competency requirement).

Fred suggested trying to get the division to adopt the two learning goals, encouraging departments to try to address as many of them as possible in the intro courses. Each department needs to formally vote on them. Brian indicated that he and Matt Beekley went through them all and made sure they are all addressed in Intro Kines.

It may be possible to write a third learning goal that would address mathematical/computational/quantitative reasoning. Steve said he would talk with whomever is necessary to work on this: someone in Math Department and in CS Department. We can certainly look to see what other schools do to address this and how they word it.

Changing SM gen ed requirement.

CS1 has a lab, which may be controversial to some. What is the goal of a lab? How scientists do their work. Hands-on, experiential, application of concepts becomes more obvious and easier to do in a lab. Labs are not the only way to gain that experience though. In some cases it using the equipment that students wouldn’t have available otherwise. What about the joy of discovery? More than just “hands on” and cookbook/demos; what about learning and experiencing the process of science: generating hypotheses, making observations, collecting their own data, doing something with the data. Concern that intro students might not have the sophistication to move beyond the “cookbook” lab (and “cookbook” should not be derogatory term—cookbooks are good and helpful).

Most of us do believe that students should have a science course and right now they can graduate without having one. But if the proposal specifies that students have to take a science lab course and says nothing specific about math, why is science being prioritized over math? Mary advocated for having more specified requirements: one in physical sciences, one in biological/behavioral sciences, one in math/computation, but could this be staffed? What if there are these three groupings and students would have to take their 2 required courses in two different groups? And does one of them have to be a lab?

What we have in common is the “scientific method” (although that really doesn’t include CS and Math).

Lab experience is a uniquely powerful way to address some of the goals.

Next steps: **Steven** will work on developing a third divisional goal. **Everyone**, please think about alternative requirements or ways that we could increase the probability that students could gain basic scientific and quantitative literacy skills in our divisional general education courses.

**Next meeting: Tuesday, Feb. 21 at 4:00**

Tentative Science and Math Division Learning Goals (based on TOSLS test)

I) Understand methods of inquiry that lead to scientific knowledge

* Identify a valid scientific argument (e.g., recognizing when scientific evidence supports a hypothesis)
* Evaluate the validity of sources (e.g., websites, peer reviewed journals) and distinguish between types of sources
* Evaluate the use and misuse of scientific information (e.g., recognize a valid scientific course of action, distinguish the appropriate use of science to make societal decisions)
* Understand elements of research design and how they impact scientific findings/conclusions (e.g., identify strengths and weaknesses in research related to bias, sample size, randomization, experimental control)

II) Organize, analyze, and interpret quantitative data and scientific information

* Decide on the appropriateness of a graph and be able to read and interpret graphical representations of data.
* Solve problems using quantitative skills, including probability and statistics (e.g., calculate means, probabilities, percentages, frequencies)
* Understand and interpret basic statistics (e.g., interpret error bars, understand the need for statistics)
* Justify inferences, predictions, and conclusions based on quantitative data

Current university wording for Q competency requirement

* understanding quantitative concepts, representational formats and methodologies of a particular discipline;
* evaluating quantitative evidence and arguments;
* making decisions based upon quantitative information; and
* learning through problem-solving, laboratory experiments and projects.