

Mathematical and Physical Sciences (MPS) 2015-2016 Assessment Report

1. The Annual Assessment Meeting

Professors Heinekamp and Hogan met in person on 3 June 2016 to assess the MPS programs and the success rates of its graduate majors in Computer Science, Mathematics, and Physics. Professor Stiadle was unable to attend but submitted his observations electronically, which will be incorporated.

2, 3. Examination of Assessment Data, and Program Changes

One of the primary sources of evidence is the quality of MPS senior theses. In 2016, there were 11 MPS theses produced (one was a double major's 'double' thesis in CS and physics, and two others were by the same individual who double-majored in math and physics).

Our observations, broken down by major area, are as follows:

CS theses: It was evident that of the 4 CS majors this year 2 produced theses that were distinctly sub-par, which we ascribe in part to a lack of faculty mentoring. The two others (including the 'double' thesis) were of sufficient quality that we are satisfied that the thesis as means of assessment and teaching is working. We concluded that the lack since 2014 of a tenure-track faculty member in CS has done significant harm to the integrity of the program, and we hope that the search that is underway for that position will succeed, and bring to Wells an individual who can stabilize and modernize the curriculum. We will support those efforts with enthusiasm.

Physics theses: Of the 3 physics theses, 1 was excellent (in combination with CS content), 1 adequate, and 1 disappointing. Students need to affiliate themselves on an ongoing basis with a faculty member in this area to ensure that their work is relevant and correct. We also note that two dual-degree engineering students (both at Columbia; one having finished his 5th year in civil engineering and the other his 4th year in nuclear/plasma engineering) received their physics major diplomas. So, in all, there were 5 physics graduates this year, the most in this writer's 30-year career at Wells. Encouraging students to take on internships in their area of interest prior to senior year seems to be a good way to generate worthwhile thesis topics; two of the higher-quality physics theses came about as a result of internship experiences.

Mathematics theses: Of 5 majors' theses, 1 was really on a CS topic (and showed some mastery of the Java language, but was a rather sketchy thesis) and the remaining 4 were nearly devoid of any mathematics content at all. Again, students must be compelled to work with a faculty member in their discipline to provide guidance.

In addition to a grade awarded for the senior thesis, an evaluation rubric was designed; a copy is attached, with the student's name removed.

Another problematic area concerns placement into introductory courses. Professor Hogan noted that a fair proportion of students in Calculus I lacked the requisite mathematical ability to succeed in the course, so we need to look at the placement process. Similarly, we need to enforce the prerequisite structure in Physics I.

The mathematics program continues to provide college-wide service in calculus and statistics courses, and is responsible for the courses that meet the college's general education requirement in quantitative reasoning.

Finally, the self-paced one-credit CS courses ("CS10X") are difficult to manage and require significant attention. In some ways this is also an issue of appropriate placement of students (do they really need these courses?) and service college-wide.

4. Action Plan for the Upcoming Year

See the previous section for the issues that we plan to address this coming year. To summarize, we hope to revise and update the CS major, in terms of overall program mission and design, and with our new faculty member, will undertake a thoughtful and systematic restructuring of the curriculum, which will entail introduction of new courses and undoubtedly elimination of some others. We will revise the senior capstone experience to insure that this final step toward graduation actually creates new knowledge in our seniors, knowledge that genuinely synthesizes and extends what they have learned prior to this in their education. Finally, at the introductory level, we will strive to insure that students are placed into the appropriate MPS courses.

5. The Updated Assessment Plan ("brief description")

See the other document for the plan itself.

Appendix: 2016 MPS403 grading guide

Name: XXXXX

Title: A Common Score: A Psychometric Analysis of the Progression of Florida State DOE's Algebra 1 Standards from 2005-2015

1. (2/5) Scholarship quality – does it seem to be aspiring to answer a clear task or thesis?

On the face of it, there could have been a good thesis here. But it completely fails to achieve its goals. Frankly, I am mystified at what you tried to correlate.

2. (3/5) Incisiveness and scientific merit of the work done.

Good digging into Florida's history of Math standard implementation, and some good research into the theories of education. And you did use some statistical analysis.

3. (2/5) Level of accomplishment: what was done at the level of senior college work in an MPS major.

Once the paper starts to explain the data analysis it becomes extremely confusing. Did you talk to any faculty in education and/or mathematics about how to handle the statistics? It would appear that your conclusion is that as the number of students passing the exam grows, the standards are changed more. Does that make sense? Or are you arguing the reverse: that as the standards are changed more, the grades go up?

4. (1/5) Evidence of a lot of effort on the thesis.

Since you never looked at resource usage or training or anything but the number of times the standards changed, I think you missed an opportunity to do good work here. I also note that you did not submit any progress reports.

5. (3/5) Quality and usage of external sources.

Some good sources. Not clear how they were used, for the most part. The sources should have been integrated into the text as citations.

6. (3/5) Comments on the document itself.

Organization is not great within sections, nor overall. The writing needs a LOT of work and I encourage you to continue getting better at it, especially if you plan to become a teacher. The work is replete with mismatched tenses and cases; improper word choices, "broken" sentences, and just plain confusing prose. You need to work on style: use transitional phrases to help the reader understand your 'plan'. The introduction and conclusion are worthy attempts to write in a scholarly way, which is good.

Total: 14/30 Course grade: C