

Program Outcomes Guide (POG)

Program Title: AS Mathematics Option

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Expected Program Learning Outcomes (PLO)

1. Use computational techniques and algebraic skills essential for success in an academic, personal, or workplace setting. (Computational and Algebraic Skills)
2. Use visualization, special reasoning, as well as geometric properties and strategies to model and solve problems. (Geometric Skills)
3. Compute probabilities and use results to analyze data and make inferences and predictions. (Statistical Skills)
4. Critically analyze and construct mathematical arguments. (Proof and Reasoning)
5. Use technology, where appropriate, to enhance and facilitate mathematical understanding, as well as an aid in solving problems and presenting solutions. (Technological Skills)
6. Communicate and Understand mathematical statements, ideas and results, both verbally and in writing, with the correct use of mathematical definitions, terminology and symbolism. (Communication Skills)
7. Work collaboratively with peers and instructors to acquire mathematical understanding and to formulate and solve problems and present solutions. (Collaborative Skills)

Assessment

- These outcomes are assessed through a series of course level assessments given to students in the courses required for the program, specifically MAT203, MAT204, MAT205, MAT206, MAT207, and MAT208. Assessment questions will each be linked back to a student learning outcome for that course and also to program learning outcome.
- Results on those questions will be stored in a database that will allow for thorough statistical analysis.

Validation

- These assessment questions are primarily chosen from sources for which a national benchmark can be attained. These sources include retired Praxis, SAT Subject, GRE Subject, and AP test questions. Each source has data available on the scoring of the questions on a national level that we can then use as a benchmark for our students.
- Several of the classes and outcomes do not lend themselves well to nationally benchmarked data. For example, there is no known source for nationally benchmarked questions for MAT208 – Linear Algebra or a national benchmark that would gauge the students' abilities to work cooperatively. For MAT208, C. Lewis collaborated with faculty at Hood College on a set of questions that both colleges would give to Linear Algebra students.
- For Outcome 7, in-house tools were used.

Results

	Benchmark Score	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018
PO 1	50.5	55.5	52.6	50.3	44.3	46.2
PO 2	47.0	54.8	52.4	51.3	41.1	48.7
PO 3	12.2	16.0	14.2	16.5	15.7	14.4
PO 4	41.5	46.6	42.3	44.5	34.1	38.4
PO 5	NA	15.2	13.3	15.6	14.7	14.1
PO 6	67.0	74.6	71.3	64.5	59.8	59.6
PO 7	NA	14.63	12.7	15.0	14.4	13.5

Comparing the scores for HCC against the benchmark we see that many objectives, while still near the benchmark, have shown an overall decline. The instructors have not changed for these courses but there are several other factors that could contribute to this decline. There were a few small changes made during this period. There was a switch to an open-source textbook for Calculus I and Calculus II and a MATLAB component was added to Differential Equations during this time. Our data set is also not great as we examine everyone taking the program courses, not just the mathematics majors. The main concern over this time period was how students were being placed into the classes. The math faculty are now doing more review in all classes based on the under preparedness of the incoming students we get. This slows down the class and affects how deeply the content is covered. Below are some of how the faculty feel students are being misplaced.

- There was some confusion about what the SAT score should be to bypass the placement system and go directly to a transcript review. In 2015 the community college presidents in Maryland agreed to drop the score from 550 to 500. In 2016 the SAT changed and a 500 on the old test correlated to a 530 on the new test. HCC, despite a signed memo of understanding recognizing the 530 change, continued to use 500 until 2019.

- There has also been an increase in the placement of students, particularly Middle College students, who do not have the required SAT or placement scores being placed in classes with the approval of an advisor. Many times these students are never reviewed by the mathematics faculty for approval.
- In 16/FA and 17/SP there were a total of 65 students who were placed directly into MAT 203 or MAT 204 as their first credit level class (32 by SAT, 27 Other Methods, and the remainder took the placement exam). The Other Methods category are all methods of placement that our database cannot track. This includes students who transferred in prerequisite courses, students who are placed by overrides (by an advisor or departmental) or students who received a 4+ on the PARCC test. Of those that were placed by SAT, three were below 530 and only one was successful. About 43% of the unsuccessful students (D-F-W) were placed by Other Methods while only 21% of those receiving A's were placed by Other Methods.
- As a department we feel that the transition to the 3.0 high school GPA as a means to bypass placement will only exacerbate this situation. There is also great concern from within the mathematics faculty about the use of the weighted GPA for this purpose as the memo of understanding explicitly states that the unweighted GPA should be used.

Follow-up

- Adjustments will be made to individual courses based on the assessment results at the course level.
- The department will develop a process for looking at just graduating MAT majors as a separate data set. The same levels will be reported for all students in the designated MAT courses, but it will also be broken out for the MAT majors.
- The department will work with the PIE office to develop a system for analyzing the preparedness of incoming students for all math classes and for the program courses in particular. While DEALS is working on a report to track success of students placed using the 3.0 HS GPA, the mathematics department feels that we should have a way of tracking the precise methods by which each student enters our classes, ie eliminate the Other Methods category from future reports. With appropriate data collection and analysis we can develop a placement system for mathematics that truly relies on multiple measures and reduces the number of transcript reviews required by Advising.
- The department will push assessments early in the semester and encourage students that demonstrate difficulties to adjust their class selection. Students placed directly into a course may not be ready for that course and should be reminded that they do not have to start at that level.
- The department has already developed two distinct math pathways to which will result in appropriate placement of students in math courses specific to their program of study and directly related to their careers. The change will also allow for greater rigor throughout the entire STEM math track, right from Math 101, College Algebra, to Math 161, Precalculus, and on the 200 level calculus sequence. It is hoped that this two track innovation, with increased rigor and appropriate placement, will result in an increased success in achievement of student learning outcomes.

Budget Justification

- Improvements to the Learning Support Center so that help is available for students of all levels. There is limited assistance for students in classes numbered at MAT204 and higher, often during the week there is one tutor available and at nights and on weekends there is no one. The faculty would like a process to hire recent HCC graduates as tutors in the LSC to assist with those classes.
- Provide a one-credit alternative faculty assignment for 19/SU so that J. Szczesniak can develop a process to extract the data for the MAT majors.