

# Mathematics Program

School of Arts & Science, University of Alaska Southeast

## 2018-19 Annual Report on Assessment of Program Learning Outcomes

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**Format:** This report adheres to the “Preferred Format” posted 3/1/2018 on the Provost’s website instead of following the posted Mathematics Assessment Plan.

### 1. Program Overview

The Bachelor of Science in Mathematics provides a solid foundation in mathematics. In addition to taking the core and interdisciplinary courses, students also take part in a seminar dedicated to undergraduate research during their last two years.

After obtaining the degree, students have opportunities in secondary education, graduate studies and direct entry into the job market. Each student is advised by faculty to achieve a specific program tailored for the student’s goals.

UAS is an institutional member of the Intercollegiate Biomathematics Alliance (IBA), a consortium of U. S. universities that promotes and fosters research and education in biomathematics. This membership opens doors to many opportunities and resources for both students and faculty at UAS.

In addition, UAS has the only Alaska chapter of Pi Mu Epsilon, a national honor society dedicated to the promotion of mathematics and recognition of students who successfully pursue mathematical understanding. The Alaska Alpha Chapter of Pi Mu Epsilon was installed in April of 2014 at UAS.

### 2. Program Learning Outcomes (PLOs)

The following program learning outcomes have been identified by the Mathematics Program faculty as being relevant to measuring the potential success of UAS mathematics Bachelor of Science graduates in the workforce or in academics.

#### *Outcome 1: Competency in Core Subject Content*

**1A.** Graduates will demonstrate skills in basic quantitative and analytic problem solving and competency in basic undergraduate mathematics coursework.

**1B.** Graduates will demonstrate knowledge of foundational theoretical concepts essential to the study of mathematics.

**1C.** Graduates will demonstrate an ability to extend and generalize foundational concepts and critically analyze and solve abstract problems in mathematics.

#### *Outcome 2: Skills in Analysis, Application, and Technology Utilization*

**2A.** Graduates will demonstrate the ability to use technology as an aid to understanding and solving mathematical problems.

**2B.** Graduates will demonstrate the ability to apply mathematical knowledge in new settings and situations.

**2C.** Graduates will demonstrate the ability to critically analyze and solve a wide variety of problems using theoretical or technological tools.

*Outcome 3: Communication Skills*

- 3A.** Graduates will demonstrate the ability to read and comprehend mathematical ideas.
- 3B.** Graduates will demonstrate the ability to communicate mathematical ideas in writing.
- 3C.** Graduates will demonstrate the ability to communicate mathematical ideas verbally.

*Outcome 4: Professionalism and Independence*

- 4A.** Graduates will produce a resume highlighting marketable mathematical skills and knowledge.
- 4B.** Graduates will demonstrate confidence in communicating mathematical ideas verbally and in writing.
- 4C.** Graduates will demonstrate the ability to independently pursue investigations in the mathematical sciences.

**3. Data Collection Method(s)**

We assessed each of our graduates on these outcomes by considering the Student Individual Record file (SIR file) for each. The contents of the SIR file are outlined below:

1. Resume
2. Degree audit
3. Final transcript
4. Final capstone seminar paper
5. Summary scorecard for the final capstone presentation
6. First seminar paper and presentation scorecard
7. Exit Survey
8. Proficiency matrix for PLO competency
9. Permanent contact information
10. Post-graduate surveys, if applicable

The permanent Juneau faculty members meet each spring (in early May) to review and evaluate the SIR file for each graduating mathematics major. There are three categories of assessment possible with a high and low in each category. The lowest category is “Does Not Meet Expectations” with a possible numerical score of 1 or 2. The second category is “Meets Expectations” with possible scores of 3 or 4. The last category is “Exceeds Expectations” with possible scores of 5 or 6.

**4. Data from 2018-2019 Academic Year**

The average score for the AY 19 graduates on each outcome is given in the table below along with the cumulative average score from AY 17 when the program began this assessment scheme.

Outcome	AY18 Average Score	Cumulative Average Score
1A	4.2	4.615
1B	3.4	4.000
1C	3	3.385
2A	4	3.846
2B	3.2	3.462
2C	3.2	3.462
3A	3.4	4.154
3B	2.8	3.538

3C	3.2	3.615
4A	2.6	2.308
4B	3.8	4.000
4C	3.8	3.923

## 5. Evaluation of Data

On average, our students are meeting program expectations with the exception of outcome 4A, graduates will produce a resume highlighting marketable mathematical skills and knowledge. Consequently, we have added more instruction on resume writing and job searches to our Junior/Senior Seminar course.

We are now giving more direct instructions with example resumes and explicit examples to illustrate how to incorporate transferable, but non-cognitive, skills from coursework. We've also added the course requirement that each student turn in a resume highlighting marketable mathematical skills and knowledge in each semester of the seminar course (MATH S392/S492). We are giving explicit written feedback on each resume submitted so that students can revise before submitting to employers or graduate schools. Since our majors are required to take the one-credit seminar four times (twice as junior seminar and twice as senior seminar), we expect that over time this outcome will see increased attainment.

In addition, the five students graduating in AY19 had a lower average score in outcome 3B, graduates will demonstrate the ability to communicate mathematical ideas in writing. We discussed this situation and concluded that two of the five students were not willing to implement faculty suggestions into their final capstone papers. They exerted just enough effort to pass courses; we are investigating changes in the program could motivate such students to take pride in their work.

In the program exit surveys, 100% of the students indicate they are somewhat or extremely satisfied with both the education they received in the math program and their interaction with the mathematics faculty. They all mentioned accessibility of math faculty and faculty willingness to help as program strengths. The main weakness mentioned was course availability – both number and frequency of offerings. However, all students acknowledged the reality of viability at a small school.

## 6. Program Changes

We are revisiting the plan to move STAT 200 from a degree requirement to the required GER for mathematics majors. This would allow for a more accurate profile of faculty teaching in the degree program since the tenured mathematics faculty in Sitka and Ketchikan, as well as a variety of adjuncts associated with those campuses, teaching STAT 200 should not be counted as teaching in the B.S. degree program. Only the five tenured faculty members in Juneau with doctorates in mathematics actually teach in the B.S. degree program. Less than half of the Juneau mathematics faculty workloads ( $\approx 1.5$  fulltime faculty) are focused on the Bachelor of Science degree in mathematics. The remainder of the workloads are focused on remedial and service courses. However, with the potential adoption of the Interstate Passport program for GERs, having a required GER for our degree might prove problematic.