



**SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS**

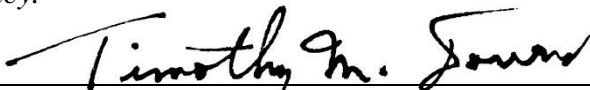
**Institutional Program Review
Report to the Board of Regents**

Use this form to submit a program review report to the system Chief Academic Officer. Complete this form for all units/programs undergoing an accreditation review, nationally recognized review process, or institutional program review. The report is due 30 days following receipt of the external and internal review reports.

UNIVERSITY:	NSU
DEPARTMENT OR SCHOOL:	Science and Math
PROGRAM REVIEWED:	Mathematics
DATE OF REVIEW:	4/6/2020
TYPE OF REVIEW:	Institutional Program Review

University Approval

To the Board of Regents and the Executive Director: I certify that I have read this report, that I believe it to be accurate, and that it has been evaluated and approved as provided by university policy.



President of the University

4/8/2020

Date

1. Identify the program reviewers and any external accrediting body:

Dr. Lindsay Erickson, Associate Professor of Mathematics, Augustana University, Sioux Falls, SD.

Augustana University is accredited by Higher Learning Commission (HLC) and NCATE (National Council for Accreditation of Teacher Education).

2. Items A & B should address the following issues: mission centrality, program quality, cost, program productivity, plans for the future, and assessment of progress.

2(A). Describe the strengths and weaknesses identified by the reviewers

Strengths:

1. Faculty Expertise

- Math faculty have a strong background in mathematics. Each faculty member is dedicated to the field, particularly as it relates to teaching and service. In particular, faculty are dedicated to improving math offerings for students and supportive of each other in these endeavors, regardless of the high teaching loads.
- Further, despite the high teaching load, faculty have published in peer-reviewed publications, perhaps not to a high quantity but certainly to a high

quality. In addition, several math faculty were integral with obtaining funds to support summer STEM camps, with the Principal Investigator being a math faculty and organizing these camps. These are the first camps of its kinds offered at Northern.

2. Math Facilities and Resources

- Math Lab is an appropriate resource as well as the classroom spaces, though these spaces are modest. Access to math resources is also available, such as MATLAB, Python, and Mathematica.
- To this end, math serves a large portion of the general education needs, and in response to this, math faculty have designed a successful Math Labs program called “Introductory Math Labs Program” to assist students in understanding math. This program is being expanded to include additional introductory courses and to include evening tutoring resources to students. Regental funding through the Math Pathways program will assist in these endeavors. It is clear math faculty care about the understanding and learning of math courses at all levels at the university.

3. Location of University

- To capture rural students, particularly those motivated to do well in mathematics, Northern State University and the math program is with situated in northeastern South Dakota to do so.

4. Math Program

- The math program is largely focused on preparing math educators in the state and region, however, there are a subset interested in math degrees and related careers. Math faculty do a good job mentoring and advising students with curriculum as well as with career opportunities and goals, not only with math students but non-math students.
- Many students, whether math education or math, easily transition into professional school or a position in industry.

Weaknesses:

1. Limited Time for Research

- Faculty and staff in the math program have high teaching loads, i.e., 24 credit hours per academic year, which precludes them from conducting research and publishing said research. In addition, the 7-10 rule implemented by the Board of Regents creates additional teaching burdens on the faculty in math, as many upper level courses are often less than 10 students. This requires faculty in math to take on additional teaching or service duties to account for the lost teaching duties. Thus, research productivity suffers and is on the lower end in the department.

2. Undefined Program Strategies

- While faculty are committed to programmatic change as well as research and service, there is no clear goal and plan outlined by or for the math program. A clear plan would help guide the program on its efforts, thus making a strong concerted effort in the “right” direction. And, hopefully help administration recognize and market said strategies.

3. Limited Support from Administration

- Faculty seem to receive little support from administration, at least from the perspective of marketing programs and faculty professional development. All the faculty, with the exception of one, are junior faculty requiring mentorship and support from all levels of the university. Help and recognition from upper administration would help math faculty be more successful thereby increasing enrollments in math.
 - Administration does not recognize the service nor teaching efforts provided by math faculty, and does not seem to understand scholarship in mathematics. Given the number of junior faculty in the math program, it is important to understand what is necessary for tenure and promotion. Materials are provided as a part of the review for reference.
4. Minimal Program Edits
- Three courses stand out as areas of consideration for the math program:
 - Math 281 Introduction to Statistics
 - Perhaps consider teaching this course as a statistics course rooted in calculus for students pursuing careers in actuary science.
 - Math 451 History of Math
 - Perhaps consider the continuation of this course, as there is currently no writing-intensive course in the math program.
 - Capstone course
 - Perhaps consider adding such to the program as a culminating event for seniors.
 - On issue with the program is the conversion of courses to independent study. This is a result of the Regental 7-10 rule that requires a certain enrollment in each class at the university. At a small university, this makes it very difficult to offer the appropriate courses to students with the actual math course codes, while also trying to tackle research and service duties.

2(B). Briefly summarize the review recommendations

The reviewer recommends the following:

1. Develop a program mission statement (that supports the university's mission) to guide program outcomes.
2. Market the program by targeting certain student populations through with work various offices on campus.
3. Consider a capstone course for the math program.
4. Continue to maintain a presence with the Tutoring program.
5. Consider minor curricular edits, as suggested in the review and noted above.

These recommendations address several goals/objectives of the math program.

2(C). Indicate the present and continuous actions to be taken by the college or department to address the issues raised by the review. What outcomes are anticipated as a result of these actions?

In response to Weakness #1:

The issue of faculty workload needs to be addressed with current and/or future administration in the SD Board of Regents. It is important as faculty we communicate with these entities about issues and needs with regard to faculty positions. Teaching loads in concert with the 7-10 rule preclude faculty from investing in scholarly activities. An outcome of doing so, at the very least, would be awareness of the issues and needs.

In response to Weakness #2:

While there are no program or departmental strategies in place, there is a CAS Strategic Plan in place. Through the suggestion of the reviewer, we plan to build a departmental level mission and program level outcomes over the next academic year.

In response to Weakness #3:

The comments made by the reviewer regarding administration seem to stem from the conversation with the dean with regard to the math program. To address any issues/concerns with regard to support from administration, it will be the prerogative of the math faculty and departmental chair to provide resources and tools to administration to provide awareness of “program happenings” and “math field requirements.” This will help the program market and celebrate their activities college-wide, while also eliminating concerns about research and service duties of math faculty.

In response to Weakness #4:

Math faculty will meet with the department chair to see how to best address the reviewer’s suggestion with regard to the math curriculum. We need to conduct a self-study based on our resources, offerings, and constraints. Upon doing so, we will build a program that not only addresses the needs of the students but can meet the needs of the university, faculty, and reviewer.

- 3. Starting in Fall 2019 reporting year, campuses will identify the undergraduate cross-curricular skill requirements as part of programmatic student learning outcomes and identify assessment methods for cross-curricular skill requirements as outlined in Board Policy 2:11. Program review completed prior to Fall 2019 need not include cross curricular skills.**

Below is the tentative new program assessment for math that attempts to address Program Learning Outcomes (PLOs) as defined by the SD Board of Regents. We have not begun our assessment using this format, as it is still being refined. The expected implementation of the math annual program assessment is AY 20-21.

Mathematics and Mathematics Education

PLO1 - Inquiry and Analysis: A systematic process of exploring issues, objects or works through the collection and analysis of evidence that results in informed conclusions or judgments. Analysis is the process of breaking complex topics or issues into parts to gain a better understanding of them. Mathematics students demonstrate an ability to break down a mathematical problem into multiple steps, resulting in an informed conclusion.

Course	Embedded assessment	Expected Benchmark
Math 123	A portion of graded homework, a portion of a graded quiz or exam, or a portion of a graded special project.	Proficient
Math 225	A portion of graded homework, a portion of a graded quiz or exam, or a portion of a graded special project.	Exemplary

Rubric:

Below Proficient	Proficient	Exemplary
Minimal understanding of mathematical processes and reasoning in calculus. (MATH 123 and MATH 225)	Basic understanding of, and has the ability to apply, fundamental mathematical processes and reasoning in calculus. (MATH 123 and MATH 225)	Deep understanding of, and has the ability to apply and analyze, fundamental mathematical processes and reasoning effectively in calculus. (MATH 123 and MATH 225)

PLO2 - Critical and Creative Thinking: A habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion. Both the capacity to combine or synthesize existing ideas, images, or expertise in original ways and the experience of thinking, reacting, and working in an imaginative way characterized by a high degree of innovation, divergent thinking, and risk taking. Mathematics students can demonstrate this by effectively communicating mathematical ideas in writing.

Course	Embedded assessment	Expected Benchmark
Math 216	A portion of graded homework, a portion of a graded quiz or exam, or a portion of a graded special project.	Proficient
Math 425	A portion of graded homework, a portion of a graded quiz or exam, or a portion of a graded special project.	Exemplary

Rubric:

Below Proficient	Proficient	Exemplary
Student uses invalid reasoning. (MATH 216 and MATH 425)	Student has no logical errors; reasoning can be followed with some effort by the reader. (MATH 216 and MATH 425)	Student has no logical errors and reasoning can be easily followed by the reader. (MATH 216 and MATH 425)

PLO 3 - Information Literacy: The ability to know when there is a need for information, to be able to identify, locate, evaluate, and effectively and responsibly use and convey that information to address the need or problem at hand. Mathematics students can demonstrate this by applying mathematical principles to solve applied problems.

Course	Embedded assessment	Expected Benchmark
Math 125	A portion of graded homework, a portion of a graded quiz or exam, or a portion of a graded special project.	Proficient
Math 321	A portion of graded homework, a portion of a graded quiz or exam, or a portion of a graded special project.	Exemplary

Rubric:

Below Proficient	Proficient	Exemplary
Student demonstrates little or no progress toward solving an applied problem. (MATH 125 and MATH 321)	Student demonstrates substantial progress toward solving an applied problem, with work shown in an organized manner. (MATH 125 and MATH 321)	Student demonstrates ability to use all necessary given information in an organized and complete way to solve an applied problem. (MATH 125 and MATH 321)

PLO 4 – Teamwork: Behaviors under the control of individual team members - effort they put into team tasks, their manner of interacting with others on team, and the quantity and quality of contributions they make to team discussions. Mathematics students will demonstrate the ability to work as team while completing a mathematical task.

Course	Embedded assessment	Expected Benchmark
Math 225	Peer evaluations of performance and participation as a member of a group completing a graded assignment, and/or portion of graded homework, a portion of a graded quiz or exam, or a portion of a graded special project.	Proficient
Math 361	Peer evaluations of performance and participation as a member of a group completing a graded assignment, and/or portion of graded homework, a portion of a graded quiz or exam, or a portion of a graded special project.	Proficient

Rubric:

Below Proficient	Proficient	Exemplary
Failure to communicate and participate in the task as a team. (MATH 225 and MATH 361)	Communicating and working as a team is evident per student and/or instructor evaluations. (MATH 225 and MATH 361)	N/A

PLO 5 – Problem Solving: The process of designing, evaluating and implementing a strategy to answer an open-ended question or achieve a desired goal. Mathematics students will write convincing arguments to prove or disprove mathematical statements.

Course	Embedded assessment	Expected Benchmark
Math 216	A portion of graded homework, a portion of a graded quiz or exam, or a portion of a graded special project.	Proficient
Math 425	A portion of graded homework, a portion of a graded quiz or exam, or a portion of a graded special project.	Exemplary

Rubric:

Below Proficient	Proficient	Exemplary
Student uses invalid reasoning. (MATH 216 and MATH 425)	Student has no logical errors; reasoning can be followed with some effort by the reader. (MATH 216 and MATH 425)	Student has no logical errors and reasoning can be easily followed by the reader. (MATH 216 and MATH 425)