



**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:	DSU
DEPARTMENT OR SCHOOL:	College of Arts and Sciences
PROGRAM REVIEWED:	Mathematics
DATE OF REVIEW:	3/31/2023
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

Click here to enter a date.

Date

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

Carla van de Sande
Associate Professor
School of Mathematical & Statistical Sciences
Arizona State University

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

Mathematics is a key service discipline to the cyber and computer science programs and the majority of mathematics majors are double majors with computer science (the symbiotic relationship that was noted in the program review). It was also noted in the review that mathematics is a key contributor to the new and emerging fields of AI and Machine Learning. The math courses offered align well with the mission of the university and the computer science program for which the majority of the math courses serve. It was noted that the vulnerabilities from the previous math program review have been addressed, in particular offering more upper level math courses and getting sufficient

enrollments. These improvements have largely been due to the growth in the Computer Science program. Enrollment statistics are contained in the math program self-study document which speak to both program productivity and cost. Better statistics will soon be available with the program productivity dashboard being created by the Board of Regents.

Weaknesses

None were explicitly stated, however in the recommendations for changes there were comments regarding AI grading and the use of technology like simulations in test preparation for students to disincentivize cheating. The math department should review technologies like gradescope mentioned by the reviewer or graid which is a company that reached out to the College of Arts and Sciences Dean and has setup information on a webpage concerning their platform for assisting with grading in STEM courses (<https://onboarding.graide.co.uk/shared/40500963-9ae1-458e-8250-dc1b8f2d962d>).

2(B). Briefly summarize the review recommendations

Although not stated in the recommendations for change, it was noted that shared appointments are beneficial to the math program and the overall academic atmosphere (part C of the report) which was brought up by the computer science and cyber faculty that participated in the review. We should do all that we can in mathematics to support the growth of cyber and computer science on campus which are central to the mission of the university as well as enhance program quality which was noted by the reviewer in 3A of the review as being a benefit of staying current with national trends as a result of the close relationship with computer science and cyber operations.

The reviewer recommended in the closing statements that the math program should investigate the use of AI in the mathematics program. This could be used to lighten the grading workload as well as being a tool to disincentivize cheating. Exam simulations were noted as a potential use of AI. The use of AI in the math program whether that be in exam simulations and/or grading ties in nicely with the collaboration and involvement with Beacom faculty.

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?

The reviewer noted issues related to assessment by mathematics faculty in regards to both time (quantity of grading being done given faculty workload) and cheating. These should be investigated as there may be some benefits. The use of AI to simulate exam situations which could provide real time support for students potentially in manners that are similar to mymathlab in regards to real time support may also be beneficial. Simulated exams could also provide an alternative pathway to reach students that may be struggling (in particular with students on the autism spectrum) and having difficulties communicating their challenges. This could be particularly helpful in the online environment and is something that we need to prioritize and investigate in the upcoming semester.

The math program anticipates the development of stronger ties and relationships with Beacom faculty that are initiated by the investigation of the use of AI in the math program.

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.

Cross Curricular Skills (CCS):

1. Inquiry and Analysis
2. Critical and Creative Thinking
3. Problem Solving
4. Information Literacy
5. Integrative Learning

Program Learning Outcomes:

1. Demonstrate knowledge of fundamental skills and concepts of mathematics. CCS 1
2. Apply mathematical methods to model and analyze real-world problems. CCS 2, 3, 4, 5
3. Use logical arguments to explore problems and prove conjectures. CCS 1, 2, 3
4. Use technology as a tool for solving mathematical problems. CCS 3, 5

Curriculum Map of required courses in the Mathematics with specialization in Information Systems (the other specializations have slightly different required and elective math courses):

	Demonstrate knowledge of fundamental skills and concepts of mathematics (CCS 1).	Apply mathematical skills to the analysis of real-world problems (CCS 2, 3, 4, 5).	Use logical arguments to explore problems and prove conjectures (CCS 1, 2, 3).	Solve mathematical problems with technology tools (CCS 3, 5).
Math 123	I	I	I	I
Math 125	D	D	I	D
Math 201	I	I	I	I
Math 281	I	I		I
Math 315	D	D	D	D
Math 316	D		D	

Curriculum Map of the elective math courses in the Mathematics with specialization in Information Systems (the other specializations have slightly different required and elective math courses):

	Demonstrate knowledge of fundamental skills and concepts of mathematics (CCS 1).	Apply mathematical skills to the analysis of real-world problems (CCS 2, 3, 4, 5).	Use logical arguments to explore problems and prove conjectures (CCS 1, 2, 3).	Solve mathematical problems with technology tools (CCS 3, 5).
Math 225	M	D		M
Math 282	D	I		
Math 318	M			

Math 321	M	M		M
Math 361	M		M	D
Math 381	M	M		D
Math 413	M		M	
Math 418	M	M		M
Math 436	D	D	D	M
Math 437	M	M	D	M
Math 471	M		M	M
Math 475	M	M		M

Key: I – Introduced
D – Developed
M – Mastered

The Math self-study documents program assessment in section 8.