

Math Department Program Review

I. Table of Contents

II. Previous Review

Result from last review	1
EPC comments & suggestions	1
Progress on goals from review	2
Changes to goals	2

III. State of Department

Catalog description	2
Enrollment/graduation data	3
Delaware Study data	3
42+ credit justification	4
<30 credit justification	4
Evaluation of resources	4
Affirmation from other depts	5

IV. Assessment

Program evaluation	6-8
Student learning outcomes	9-10
Goals for next review	11
Request for proposal approval	12-18
Chair confirmation letter	19
Dean confirmation letter	20
GenEd Director confirmation	20
Assessment Coord. confirmation	21
WI-Coordinator confirmation	21

Appendices

A) Rationale for staffing requests	
B) 2010 Assessment Portion	
C) Essential Functions worksheet	
D) 2011-12 Annual Assessment	

Math Department

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II. Previous Program Review

A) Results, comments, and suggestions from last program review

EPC last reviewed programs within the Math Department on May 11, 2010. Minutes from that meeting state:

The motion to approve the Mathematics Program Review passed, pending confirmation with the Teacher Education program that changes meet licensure requirements and pending corrections and additions agreed to during this meeting (e.g., CCSI 185 as an option to CSCI 195 for mathematics education majors and dropping of MATH 230 from the Catalog).

Rather than making these corrections and additions, the Department chose to conduct a new, more systematic and reflective review of its programs.

Specific comments and suggestions from the EPC review include:

- 1) Since math education majors are required to complete a programming course, EPC recommended the phrase “take CSCI 195 or another CSCI elective” be replaced with “take CSCI 195 or CSCI 185” in math education program requirements.
- 2) EPC noted that MATH 230 (Topics in Math), MATH 371 (Real Analysis II), and MATH 381 (Abstract Algebra II) had not been offered in the past 3 years. The Department proposed to eliminate MATH 230 but noted the importance of keeping MATH 371 and MATH 381 for students intending to do graduate study. Grouping these courses under a single “Topics” course could negatively impact these students.
- 3) EPC inquired about possibilities for collaboration with other disciplines.
- 4) EPC noted credit hours on course summary sheets for MATH 395 and MATH 396 need to be corrected to read 1 credit hour.
- 5) EPC reminded the Department that writing emphasis reports needed to be completed on writing intensive courses at the end of each semester.
- 6) EPC inquired why only 300-level assessment results were included in the program review. The Department noted its progress in assessing its General Education courses.
- 7) EPC inquired how well remediation courses are meeting the needs of incoming students. The Department responded with an explanation of how MATH 095 prepares students for General Education level math courses.
- 8) EPC inquired about the effectiveness of online-supplemented courses. The Department explained how online-supplemented courses allow for immediate feedback and further practice.
- 9) EPC noted that proposed changes needed to be confirmed with the Teacher Education Program.

The Department believes these suggestions have been addressed in this program review.

B) Progress made towards goals set in previous program review

The Department did not formally set goals in its previous program review; however, the Department did set goals during its meeting in the Summer of 2010. These goals included:

- 1) Reviewing and improving strategies for placing incoming students in math courses.
- 2) Reviewing General Education offerings in light of new General Education outcomes.
- 3) Developing a more effective assessment strategy for majors.

The Department made significant progress towards these goals during the 2010-11 academic year. The Department Chair conducted a comprehensive evaluation of institutional math placement strategies using data from 2007-2010. This evaluation was then presented to several faculty groups and administrators for input. The Department also reviewed General Education offerings, meeting with the Director of General Education, the College of Business, the Nursing Department, and other faculty groups. Finally, the Department also met to review assessment strategies for math and math education majors. These discussions led to the proposals set forth in this program review and the “Math Department Proposals” document.

C) Changes to the goals and rationale, or reasons for not meeting set goals

This section will apply to our next program review.

III. State of the Department

A) Current Catalog description and recommendations for changes

The 2011-13 Catalog displays the following information:

Requirements for a Bachelor of Science with a Major in Mathematics: 37 credits including MATH 191, 192, WI-220, 290, 300, 320, 370, 380, WI-395, WI-396; three courses from: MATH 291, 301 or 305, 371, 375, 381, 400; Complete CSCI 195 or another approved computer programming language.

Requirements for a Minor in Mathematics: 20 credits including MATH 191, 192, 290 and 300, and at least two courses from: MATH WI-220, 291, 301 or 305, 320, 370, 380.

Requirements for a Bachelor of Science with a Major in Mathematics Education: 33 credits in mathematics including MATH 191, 192, WI-220, 290, 300, 338, 340, 360; three courses from MATH 291, 301 or 305, 320, 370, 380, 400; six credits in computer science including CSCI 195 and another CSCI elective.

Requirements for a Secondary Teacher's Certificate with a Minor in Mathematics: 27 semester credits in mathematical sciences including MATH 191, 192, WI-220, 290, 300, 338, 340, 360, and one course from MATH 291, 301 or 305, 320, 370, 380; and six credits in computer science including CSCI 195 and another CSCI elective. Education courses required for a teaching major are listed in the Education Department section.

This description accurately describes our current program requirements. Within this program review, we propose curricular changes to all 4 programs within the Department. Catalog descriptions reflecting these proposed changes can be found on pages 12-13 and in the attached “Mathematics Department Proposals” document.

B) Enrollment and Graduation data

Student Enrollment	2004	2005	2006	2007	2008	2009	2010	2004-10
Math Majors	9	10	11	7	8	7	3	-67%
Math Education Majors	11	13	18	16	12	17	26	+136%
Math Total	20	23	29	23	20	24	29	+45%
Campus Undergrad Total	2308	2355	2490	2566	2607	2577	2546	+10%

Source: <http://web.sau.edu/ir/majorenroll.htm>

Graduates	03-04	04-05	05-06	06-07	07-08	08-09	09-10	2003-10
Math Majors	3	5	0	3	0	2	4	+33%
Math Education Majors	2	2	3	6	5	5	4	+100%
Math Total	5	7	3	9	5	7	8	+60%
Total Bachelor's Degrees	539	585	549	577	595	655	669	+24%

Source: <http://web.sau.edu/ir/degrees.htm>

Since 2004, the total number of students enrolled in our majors has remained fairly stable (from a low of 20 in 2004 to a high of 29 in 2010). Likewise, the number of graduates in any particular year has ranged from 3 to 9. The number of Math Education majors may have been positively impacted by the availability of the Noyce Grant scholarship (up to \$20,000 awarded over two years for eligible math education majors). With this Grant expiring, enrollment may temporarily decline beginning in 2011-12. Other than this grant, the Department, and institution as a whole, have not made a concerted effort to recruit math majors.

C) Delaware Study results**Table 3A - Student credit hours (SCH), organized class sections (OCS), and FTE students taught per term per FTE instructional faculty: Tenured & tenure-track faculty**

Year	Discipline	FTE faculty	Undergrad SCH/FTE faculty	Undergrad OCS/FTE faculty	FTE students taught / FTE faculty
2007-08	Mathematics	5.00	128	2.8	8.6
	National Norms		218	3.0	15.0
2008-09	Mathematics	4.00	126	4.3	8.4
	National Norms		230	3.0	15.6

Table 3F - Student credit hours (SCH), organized class sections (OCS), and FTE students taught per term per FTE instructional faculty: All faculty

Year	Discipline	FTE faculty	Undergrad SCH/FTE faculty	Undergrad OCS/FTE faculty	FTE students taught / FTE faculty
2007-08	Mathematics	8.24	144	3.3	9.6
	National Norms		263	3.4	17.9
2008-09	Mathematics	9.07	146	4.0	9.7
	National Norms		271	3.3	18.3

Table 4 - Instructional unit costs, research and public service expenditures (DIE = Direct instructional expenses)

Year	Discipline	FTE faculty	% tenured/tenure-track	DIE/SCH (\$)	Cost/FTE student	Personnel costs (% of DIE)	Research \$ / FTE faculty	Public Service \$ / FTE faculty
2007-08	Mathematics	8.24	61	193	5785	98	0	0
	National Norms			146	4364	97	1954	106
2008-09	Mathematics	9.07	44	188	5634	100	0	0
	National Norms			141	4157	97	1132	120

D) If the degree program requires >42 credit hours in the discipline justify and document the requirements

N/A

E) If the degree program (2nd major) requires <30 different credit hours justify and document the requirements

N/A

F) Evaluation of instructional resources: to include, but not be limited to facility resources and staffing resources

Resource	Status	Need	Supporting Evidence
Facilities	Sufficient	--	The Registrar's Office has found adequate classroom space for our courses. All our faculty have adequate office space.
Staffing	Insufficient	<p>Full-time Developmental Math Specialist to manage and coordinate our developmental math program and teach 100-level courses.</p> <p>Full-time line to teach Calculus and other upper-and lower-level courses.</p>	<p>In 2010-11, we opened a search for a tenure-track position and visiting line. We were unable to fill these positions. This year, we are covering 16 courses through a 1-year visiting line and adjunct. We anticipate opening two searches again this year.</p> <p>Rationales for staffing requests, approved in 2010, can be found in Appendix A.</p>
Technology	Unsure	<p>Existing technology resources are minimally adequate for our current needs. Proposals in this program review may require additional computer lab space and software. The Department will look into free, open source software solutions for our course software needs.</p>	<p>Our proposed QUANT 113 course will be taught in a computer lab, possibly requiring additional lab space at SAU.</p> <p>Our proposed MATH 099: Developmental Math course may require additional lab space.</p>
Equipment	Sufficient	--	--
Information Resources	Sufficient	While current resources are adequate, we may look to maintain a more up-to-date website with additional resources for students.	The Math Department website was updated in June 2011.
Marketing & Comm.	Sufficient	While current resources are adequate, we may look to increase our recruiting presence.	--
Other: Assessment funds	Sufficient	We may need additional funds in the future to administer the Major Field Test (MFT) in Mathematics to our math majors.	We will administer the MFT in our MATH 395 seminar course to assess student learning (\$25 per student). We may need additional funds or a student fee for this course.

Explain the steps your department/program has taken (or will take) to secure areas of need noted above

Staffing

We received approval for our staffing requests during the 2010-11 academic year. We have begun the search for a tenure-track position and anticipate opening a search for a visiting position this year. The original rationales for these requests can be found in Appendix A.

Technology

We will meet with IT to coordinate the development and implementation of our MATH 099 course. We will continue to evaluate our technology needs in major-specific courses.

Information Resources

We will continue to update our website and appoint someone in our department to serve as website coordinator.

G) Affirmation that the department has consulted with and gained approval of other programs to continue providing resources to deliver curriculum required for the major or minor

In addition to Math and General Education requirements, our programs require students to complete computer science courses:

Letter from Chair of Computer and Information Sciences Department:

Brad;

The Computer and Information Sciences Department looks forward to our continuing relationship with the Math Department. The Math and Math Education students who enroll in our classes are generally well prepared and add a dimension to the classroom beyond Computer Science.

Our resources and course planning objectives are adequate to support your requirements for the foreseeable future.

We look forward to continuing our service to the Math and Math Education students.

Kenneth R. Grenier
Asst. Professor and Chair, Computer Information and Sciences Department
St. Ambrose University
518 W. Locust
Davenport, IA 52803
(563) 333-6000

Math education majors are also required to complete courses within the Teacher Education Program.

Letter from Director of Teacher Education Program:



Dear Dr. Thiessen,

Thank you for meeting and sharing the proposed math program changes with me. As you and I discussed, I am in full support of your recommendations. Please consider this my statement of support.

If you need anything else, don't hesitate to contact me.

Have a good day,
Judith White

Dr. Judith Deierling White
Director of Teacher Education
Licensure Officer
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IV. Assessment

A) Program evaluation

Describe the conceptual framework of your department, explaining how majors align with department & institution

The mission of the Mathematics Department is to provide all students opportunities to develop mathematical and quantitative skills to model systems and solve problems. The Department provides its majors with a deep understanding of mathematical concepts and mastery of problem-solving skills to prepare them for immediate employment or enrollment in graduate/professional programs.

This mission, which aligns with the institutional mission to enable students to develop intellectually to enrich their own lives and the lives of others, guides our practices and Departmental goals:

Teaching courses for non-majors:

1. To provide all students mathematical concepts and problem-solving skills appropriate to their discipline
2. To provide all students an appreciation for mathematics

Teaching courses for mathematics majors:

1. To provide majors high quality, rigorous coursework that extends their practical and theoretical understanding of mathematics
2. To provide majors opportunities to master skills in problem solving, analysis, and research
3. To provide majors opportunities to develop the ability to communicate effectively in their discipline

Teaching courses for secondary mathematics education majors:

1. To provide pre-service teachers with courses consistent with state teaching standards, NCTM standards, and best practices
2. To ensure pre-service teachers have mastered concepts and skills beyond what they will be expected to teach

Professional development and service:

1. To keep current in our disciplines
2. To encourage undergraduate research opportunities
3. To assist our students in seeking employment or admissions to graduate programs
4. To provide ongoing mentoring and in-service learning opportunities to practice mathematics teachers

As our programs' student learning outcomes will demonstrate, our majors align perfectly within our departmental mission and goals. Our courses and assessment methods are modeled on the recommendations from the Mathematical Association of America. Our tenured faculty, having terminal degrees in mathematics and statistics, are qualified to teach courses within these majors.

Present findings associated with program evaluation as appropriate

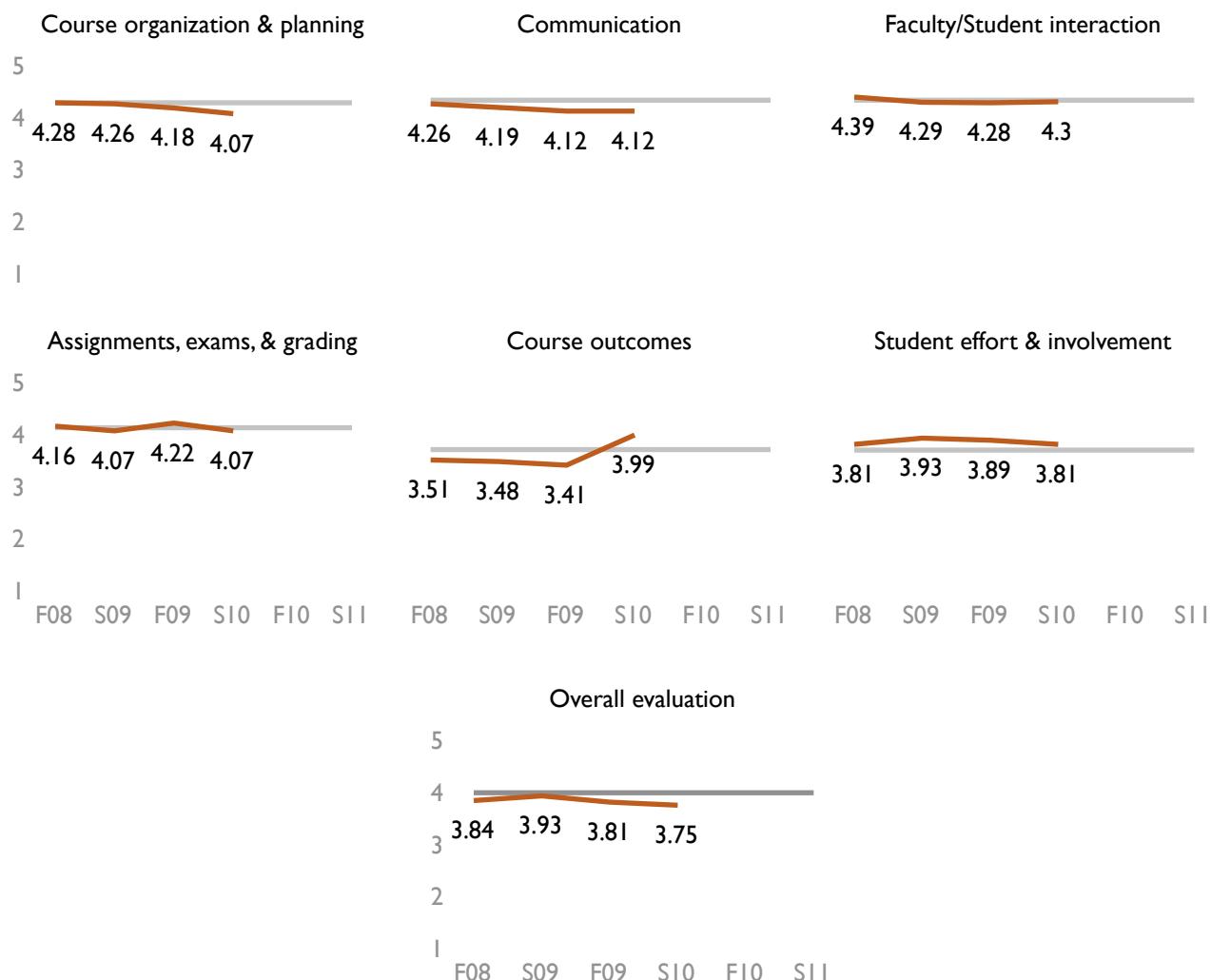
While we do not administer an alumni survey to our majors, we attempt to track our graduates and we collect data from the institutional alumni survey. According to the table on page 3, we have had 42 graduates since 2004 (13 math majors and 23 math education majors). Using a list of our graduates since 2004, we created a table displaying the post-graduation activities of our alumni:

Mathematics Graduates	'04	'05	'06	'07	'08	'09	'10	Totals
Graduate school in discipline	1			1		1		3
Graduate school outside in related discipline		2					2	4
Employment in discipline				1				1
Employment outside discipline	1	1				1		3
Unknown	1	2		1				4
Total number of graduates	3	5	0	3	0	2	2	15

Math Education Graduates	'04	'05	'06	'07	'08	'09	'10	Totals
Graduate school in discipline			1		1			2
Graduate school outside in related discipline								
Teaching math	2	2	2	6	3	5	4	24
Employment outside discipline					1			1
Unknown								
Total number of graduates	2	2	3	6	5	5	4	27

To demonstrate student satisfaction with the courses we offer, the following table summarizes our course evaluations:

Dimension		Fall 08	Spring 09	Fall 09	Spring 10	Fall 10	Spring 11
Course organization & planning	SAU Math	4.28	4.26	4.18	4.07		
	Norm	4.28	4.28	4.28	4.28		
Communication	SAU Math	4.26	4.19	4.12	4.12		
	Norm	4.33	4.33	4.33	4.33		
Faculty/Student interaction	SAU Math	4.39	4.29	4.28	4.30		
	Norm	4.33	4.33	4.33	4.33		
Assignments, exams, & grading	SAU Math	4.16	4.07	4.22	4.07		
	Norm	4.13	4.13	4.13	4.13		
Course outcomes	SAU Math	3.51	3.48	3.41	3.99		
	Norm	3.71	3.71	3.71	3.71		
Student effort & involvement	SAU Math	3.81	3.93	3.89	3.81		
	Norm	3.70	3.70	3.70	3.70		
Overall evaluation	SAU Math	3.84	3.93	3.81	3.75		
	Norm	3.99	3.99	3.99	3.99		



To demonstrate the professional development of our faculty, the following table lists major faculty achievements since our last review:

Grant activity	Publications/Presentations	Other
<ul style="list-style-type: none"> • Co-PI for the Noyce Grant (2006-10) • Advisor for NSF-TUES grant, "Innovative Randomization-based Curriculum for Undergraduate Statistics Courses" (2011-) 	<ul style="list-style-type: none"> • <i>Effect of Correlation Types on Nonmetric Multidimensional Scaling Results of ITED Data</i>; cited in <i>The Users' Guide to Multidimensional Scaling</i>, Coxon (2005) • Iowa Algebra Readiness Assessment (2006) • <i>Educator Test Manipulations</i> presented at NCME meeting in Chicago (2007) • <i>Nonparametric Comparisons of High-Stakes and Low-Stakes Trends: 2003-2007</i> presented at NCME meeting in New York (2008) • Runner-up in Results of "A Real Challenger Puzzle" Graphics Contest; CHANCE, 23(2) (2010) • Group-Framing and Corresponding von Neumann Algebras, AAMS, 2(5) 2010. • Index on von Neumann Algebras Induced by Graphs. Invited talk at the University of South Dakota, Mar. 2010. • Diagram Groupoids and von Neumann Algebras. CAOT, June 2010. • Graph Fractaloids: Classification and Application of Graph Groupoids with Fractal Property. Classification and Application of Fractals, NOVA Publisher, July 2010. • Moment Computations of Graphs with Fractal Property. JAMC, August 2010. • Graph-Matrices and Matricial Graph C*-Algebras. B. of KMS, Dec. 2010. • Index on von Neumann Algebras Induced by Graphs. Appl. Math Sci., Jan 2011. • Free Probability Induced by Electric Resistance Networks on Energy Hilbert Spaces, Opuscula Math, March 2011. 	<ul style="list-style-type: none"> • Blommers-Hieronymous-Feldt Fellowship for Outstanding Graduate Student in Measurement & Statistics (2004-07) • Proposal reviewer for National Council on Measurement in Education annual meetings (2007-) • Peer reviewer: J. of Math Analysis & Appl, 336, no. 1, (2007) • Peer reviewer: J. of Korea Soc. Math. Educ. Ser. B: Pure Appl. Math., 14, no. 4, (2007) • Peer reviewer: ACTA Applied Math (2008) • Paper reviewer: Far. east. J. Math. Sci. (FJMS) 29, no. 2, (2008) • Peer reviewer: Discrete and Continuous Dynamical Systems (2009) • Peer reviewer: Elect. Comm. in Probab. 14, (2009) • Peer reviewer: Complex Analysis & Operator Theory (2010) • Peer reviewer: Journal of Applied Mathematics and Computing (2010) • Peer reviewer for Journal of Statistics Education (2010) • Received Accredited Professional Statistician status from the American Statistical Association (2011)

To demonstrate the service of our faculty, the following table lists the university committees and groups to which we contributed:

University Committees	Other groups
<ul style="list-style-type: none"> • Assessment & Evaluation Advisory Board (2003-) • Educational Policies Committee (2005-) • General Education Committee (2008-) 	<ul style="list-style-type: none"> • Noyce Scholarship Committee (2006-2011) • Honors Committee (2008) • Teacher Education Program Advisory Council (2010-) • Engineering Advisory Council (2010-) • STEM Chairs group (2010-) • Fullbright Scholar proposal group (2011-)

B) Student learning outcomes

Present evidence that students achieve your stated student learning outcomes

In the review that was submitted to EPC in 2010, the Department provided an explanation of its assessment practices, progress towards the assessment of student learning, and data from these assessments. If EPC wishes to review this information again, it has been provided in Appendix B. Additional assessment data are incorporated throughout this document and in the “Mathematics Department Proposals” document attached to this review.

Explain how student learning outcomes are appropriate to mission, programs, degrees, and students

Appendix B shows the 14 outcomes (8 common to all majors; 3 each for our Mathematics and Mathematics Education majors) we developed for our 2010 program review. As we worked with these outcomes, we found that they were perhaps too specific to be program-level outcomes. They also didn’t reflect the curricular changes we propose in this document. Therefore, following guidelines from the Mathematical Association of America (MAA), we refined our program-level student learning outcomes as follows:

In completing degree requirements, all Mathematics Majors and Mathematics Education Majors will:

- 1) Demonstrate a breadth and depth of knowledge appropriate for a bachelor’s degree in mathematics
- 2) Persevere in modeling and solving routine, non-routine, and applied problems, using appropriate resources strategically
- 3) Demonstrate the ability to learn mathematics independently by locating and assimilating technical material
- 4) Communicate mathematical ideas using proper terms and symbols
- 5) Write concise and rigorous mathematical proofs

Mathematics majors will:

- 6) Appreciate the career and educational opportunities for mathematics majors

Mathematics Education majors will:

- 7) Critically consume and apply research and local/state/national standards in mathematics education to plan, deliver, and evaluate effective instruction.

With their focus on mathematical and quantitative skills; modeling and problem solving; depth of understanding and post-graduation preparation, these 7 outcomes align perfectly with the Departmental mission. Their alignment with MAA recommendations for undergraduate programs demonstrates how these outcomes are appropriate to our programs, degrees, and students.

With these new student learning outcomes and the annual assessment process, we anticipate significant improvements in our SLO assessment. As our 2011-12 annual assessment form shows (in Appendix D), we will assess our student learning outcomes through an externally-normed, standardized assessment (Major Field Test); embedded, internally-developed course assessments, and instructor/peer evaluations of student work products.

Document how your department analyzes and uses evidence of student learning

The attached “Mathematics Department Proposals” document demonstrates that our Department has analyzed and used evidence of student learning to evaluate institutional placement standards and propose changes to program requirements and curricular offerings. Each year, we use evidence of student learning in discussions during the first Departmental meeting each year, in emails to the Industrial Engineering Department and in preparation for their ABET accreditation, and in reviewing course outcomes, materials, and teaching methods.

Describe how your faculty members share responsibility for student learning and its assessment

As a Department, we set student learning outcomes and develop common assessments in MATH 151. In all other courses, each faculty member is responsible for developing assessments and evaluating student learning. Beginning this year, the Department will begin collecting course exams, exam results, and examples of student work in several courses. If we find this process valuable and feasible, we will expand it to all our course offerings.

Reflect on evidence and describe your findings. Propose any needed changes to curriculum or student learning outcomes. Include how you evaluate and improve your efforts to assess and improve student learning

Our reflection on assessment results from our 2010 program review, including an explanation for how we intend to improve our assessment of student learning, can be found in Appendix B. Updated findings can be found in the attached “Mathematics Department Proposals” document.

The proposed changes to our student learning outcomes can be found on page 9.

Proposed curricular changes can be found on pages 12-18 and in the attached “Mathematics Department Proposals” document.

We anticipate the new annual assessment process will greatly improve our efforts to assess and improve student learning. As will be documented in the annual assessment form, we will begin administering the Major Field Test in Mathematics to our mathematics majors. Our existing (MATH 395) and proposed (MATH 399) capstone courses will also enhance our ability to evaluate and remediate student learning. We will begin investigating resources that will help us collect and maintain assessment data.

Describe how you inform your various stakeholders (students, employers, accreditation agencies, etc.), both on and off campus, about what and how well your students are learning

Other than students receiving feedback on in-class assessments, we do not adequately inform our stakeholders about student learning in our major programs. We inform potential employers of individual student performance when they call for recommendations. We have worked to inform the campus community on student learning in our developmental and General Education courses through presentations and meetings.

Based on this student learning outcomes section, provide department goals for next review cycle. Include an outline of Department's plans to meet these goals

Goal	Rationale	Plan
<ul style="list-style-type: none"> • Improve the collection, analysis, and reporting of assessment results 	<ul style="list-style-type: none"> • While we have always assessed student learning through in-class exams, we have not adequately collected and reported that data in a formal manner. Improving the collection and reporting of assessment data will allow us to more clearly identify areas for programmatic improvement. 	<ul style="list-style-type: none"> • Complete the Annual Assessment process each year, responding to feedback from the Assessment & Evaluation Advisory Board. Provide assessment results online, when appropriate.
<ul style="list-style-type: none"> • Evaluate and improve our developmental math program, including math placement of incoming students. 	<ul style="list-style-type: none"> • For the past five years, we've been collecting assessment data from our math placement strategies and our developmental course (MATH 095). In this program review, we propose changes to placement and our developmental program. We need to evaluate the impact of these changes on students and other stakeholders. 	<ul style="list-style-type: none"> • Continue to collect ACT scores, math placements, and student performance in SAU math classes. Assess student performance in our developmental program and evaluate student, and faculty satisfaction with placement and developmental mathematics.
<ul style="list-style-type: none"> • Refine our course offerings for non-majors 	<ul style="list-style-type: none"> • We're proposing changes to our existing non-major (General Education and/or service) courses, so we need to evaluate the impact of those changes. 	<ul style="list-style-type: none"> • We will continue to meet with other departments to determine what they need from our service courses. We will also evaluate student satisfaction and achievement in courses for non-majors.
<ul style="list-style-type: none"> • Evaluate the courses we offer for elementary math endorsement to ensure they meet state standards and align with best practices. 	<ul style="list-style-type: none"> • We have begun meeting with faculty from the Teacher Education Program to identify potential improvements to our elementary math endorsement curriculum. 	<ul style="list-style-type: none"> • We will continue to work with the Teacher Education Program to evaluate our course offerings. We hope to propose improvements prior to our next program review.
<ul style="list-style-type: none"> • Work towards a "Department of Mathematics and Statistics" with a B.S. in Statistics and Actuarial Science and a statistics minor. 	<ul style="list-style-type: none"> • We are noticing a growing number of students interested in statistics and actuarial science. With our existing faculty and courses, it would not take too much more to offer such a program. 	<ul style="list-style-type: none"> • We will keep this potential program in mind as we fill our staffing needs. We will begin the process of proposing a new program, identifying community need, student demand, and program costs. We may propose this new program at our next program review.

Requests for approval of proposed changes

A detailed explanation and rationale for our proposed changes can be found in the attached document, "Mathematics Department Proposals." Program-level proposals are listed first, followed by a table on the next page detailing changes at the course-level:

- 1) Change requirements for Math Education majors and Secondary Teacher's Certificate programs:
 - a) Replace "six credits in computer science including CSCI 195 and another CSCI elective" with "3 credits in computer programming" to meet state requirements.
 - b) Replace "three courses from MATH 291, 301 or 305, 320, 370, 380, 400" with "MATH 301, 370, and 380" to align with state requirements and reduce the number of under-enrolled courses we offer.
 - c) Require Math Education majors to complete MATH 395 (1 credit) and a new course, MATH 399 (3 credits)
 - d) No longer cross-list EDUC 338 as MATH 338 to better represent course content and outcomes.
 - e) Require students to complete MATH 191 and 192 with a grade of B or better

Current Catalog descriptions:

Requirements for a Bachelor of Science with a Major in Mathematics Education: 33 credits in mathematics including MATH 191, 192, WI-220, 290, 300, 338, 340, 360; three courses from MATH 291, 301 or 305, 320, 370, 380, 400; six credits in computer science including CSCI 195 and another CSCI elective.

Requirements for a Secondary Teacher's Certificate with a Minor in Mathematics: 27 semester credits in mathematical sciences including MATH 191, 192, WI-220, 290, 300, 338, 340, 360, and one course from MATH 291, 301 or 305, 320, 370, 380; and six credits in computer science including CSCI 195 and another CSCI elective. Education courses required for a teaching major are listed in the Education Department section.

If proposals are approved:

Requirements for a Bachelor of Science with a Major in Mathematics Education: 36 credits in mathematics including MATH 191, 192, WI-220, 290, 300, 301, 340, 360, 370, WI-380, 395, 399; 3 credits in computer programming. MATH 191 and 192 must be passed with a grade of B or better.

Requirements for a Secondary Teacher's Certificate with a Minor in Mathematics: 27 semester credits in mathematical sciences including MATH 191, 192, WI-220, 300, 301, 340, 360, 395, 399; 3 credits in computer programming. MATH 191 and 192 must be passed with a grade of B or better. Education courses required for a teaching major are listed in the Education Department section.

- 2) Change requirements for Math majors:

- a) Reduce electives from 3 to 2; require MATH 291.
- b) Eliminate MATH WI-396.
- c) Replace "CSCI 195 or another approved computer programming language" with "3 credits in computer programming"

Current Catalog descriptions:

Requirements for a Bachelor of Science with a Major in Mathematics: 37 credits including MATH 191, 192, WI-220, 290, 300, 320, 370, 380, WI-395, WI-396; three courses from: MATH 291, 301 or 305, 371, 375, 381, 400; Complete CSCI 195 or another approved computer programming language.

If proposals are approved:

Requirements for a Bachelor of Science with a Major in Mathematics: 37 credits including MATH 191, 192, WI-220, 290, 291, 300, 320, 370, WI-380, 395; two courses from: MATH 301 or 305, 371, 375, 381, 400; 3 credits in computer programming.

- 3) Change requirements for a Minor in Mathematics.
- Eliminate electives
 - Require MATH 291: Calculus III and MATH 320: Differential Equations

Current Catalog descriptions:

Requirements for a Minor in Mathematics: 20 credits including MATH 191, 192, 290 and 300, and at least two courses from: MATH WI-220, 291, 301 or 305, 320, 370, 380.

If proposals are approved:

Requirements for a Minor in Mathematics: 21 credits including MATH 191, 192, 290, 291, 300, and 320.

- 4) Eliminate the institutional “mathematical reasoning” graduation requirement (page 17 of the 2009-11 Catalog). In effect, this would replace the requirement with the existing “use quantitative information to solve problems” General Education student learning outcome. The institution never had an institutional mathematics-related student learning outcome (or purely math-related requirement), so this will clarify the General Education and graduation requirements for students. A more detailed rationale is provided in the attached “Mathematics Department Proposals” document.
- 5) Modify credits awarded to students completing the AP Calculus exams.

AP Test	Test Score	Current credits awarded	Proposed change
Calculus AB	1-2	0 credits	0 credits
	3-5	8 credits (MATH 191, 192)	4 credits (MATH 191, 192)
Calculus BC	1-2	0 credits	0 credits
	3-5	12 credits (MATH 191, 192, 291)	8 credits (MATH 191, 192)

This proposal was made after aligning the curriculum in AB and BC Calculus with student learning outcomes in MATH 191, 192, and 291. Currently, students earning scores of 3-5 on the Calculus BC exam are awarded credit for Calculus III even though they have never been introduced to content from that course. Likewise, students earning scores of 3-5 on the Calculus AB exams are awarded credit for Calculus II without seeing any Calculus II content.

- 6) Modify the institutional math placement standards as follows:

Old Standards	Proposed Standards
ACT Math \leq 17: Students placed in MATH 095	ACT Math \leq 21: Students can take MATH 099 Students can take QUANT 113 Students can take QUANT 131
18 \leq ACT Math \leq 22: Students can take GenEd course	22 \leq ACT Math \leq 27: Can take MATH 099 - 171, 210 Can take QUANT 113, 131
ACT Math \geq 23: Math reasoning requirement met	ACT Math \geq 28: GenEd (quantitative) outcome met Students can take MATH 191 Students can take STAT 213

While a more detailed rationale is provided in the attached “Mathematics Department Proposals” document, it is important to note that these proposed changes will make it possible for more students to meet institutional graduation requirements by taking a single mathematics or quantitative course (rather than taking two courses, as is currently required for all students with ACT Math scores less than 18).

Our course-level proposals, explained in greater detail in our “Mathematics Department Proposals” document, include the following:

Course	Action proposed	Rationale/evidence/notes
MATH 091: Fundamentals of Math Workshop	Eliminate	We will replace these courses with MATH 099: Developmental Mathematics. The MATH 091-096-101 ACCEL sequence and MATH 095 main campus course weren't flexible enough to meet the needs of students with ACT Math scores ranging anywhere from 13-17. Many students, after completing MATH 095, were still unprepared for college-level math courses.
MATH 095: Intermediate Algebra	Eliminate	
MATH 096: Intermediate Algebra Workshop	Eliminate	
MATH 101: Orientation to College Math	Eliminate	
MATH 099: Developmental Mathematics	Add	This online course will replace MATH 091, 095, 096, and 101. It will allow us to better prepare a larger number of students for college-level math courses while requiring fewer staffing resources. The online course will also provide students with more opportunities for meaningful practice and immediate feedback.
QUANT 113: Applied Probability	Add	This new course will provide another opportunity for students with ACT Math scores ≤ 21 to fulfill the General Education “quantitative problem solving” outcome in a single course. This course is also designed to complement existing statistics courses, such as STAT 213 and STBE 337.
MATH 131: Math for Liberal Arts	Change to: QUANT 131: Thinking Mathematically	This new prefix better represents course content and outcomes. It also better specifies that this course is designed to meet the General Education “quantitative problem solving” outcome for students in majors that do not require additional mathematics courses.
MATH 151: College Algebra	Eliminate before Fall 2013	This course does not address the “quantitative problem solving” outcome, so it will serve no purpose. It will also mirror curricular changes at the Iowa Regents Universities, where College Algebra is not considered to be a college-level course.
MATH 152: Trigonometry	No change	Some departments identify MATH 151 as a required course (or prerequisite). These departments will have 2 years to choose a replacement course (MATH 171, with similar outcomes, is the obvious choice).
MATH 161: Math for Business/Economics	Eliminate	We have met with the College of Business and they approve of eliminating this course. This course suffered from low enrollment. The College of Business is currently working to identify content and outcomes they desire from a math course for their majors.
MATH 171: Elementary Functions	No change	This course, which combines outcomes from MATH 151 and MATH 152, would be the obvious replacement for majors/courses currently requiring MATH 151.
MATH 191: Calculus & Analytic Geometry I	No change	
MATH 192: Calculus & Analytic Geometry II	No change	
MATH 210: Theory of Arithmetic	No change	
MATH 211: Math Concepts for Teachers	Add	This course was approved by EPC in 2010-11 under the name EDUC 317: Math Concepts for Teachers. The Teacher Education Program and Math Department agree that this course better aligns with the Mathematics Department mission and is more accurately identified as a 200-level course.

Course	Action proposed	Rationale/evidence/notes
WI-MATH 220: Introduction to Logic & Proof	Reduce prerequisites from MATH 191 to 171	In reviewing course outcomes, we realized Calculus skills were not required for MATH 220.
MATH 230: Topics in Mathematics	Eliminate	As noted by EPC in 2010, this course has not been offered in the last 4 years. The renamed QUANT 113 course will serve the intended purpose of this course.
MATH 280: Engineering Math	Eliminate	In response to an ABET site visit, the Engineering programs propose eliminating this course.
MATH 290: Elementary Linear Algebra	No change	
MATH 291: Calculus & Analytic Geometry III	No change	
MATH 300: Probability & Statistics I	Rename and cross-list as STAT 300: Modern Probability & Statistics	To align with best practices in undergraduate statistics education, statistics courses should be identified with a prefix distinct from MATH.
MATH 301: Probability & Statistics II	Rename and cross-list as STAT 301: Regression & the General Linear Model	The name changes better reflect course content and distinguish the courses from applied statistical methods courses.
MATH 305: Data Analysis	Rename and cross-list as STAT 305: Modern Data Analysis	To better reflect course outcomes, we will change the prerequisite of MATH 300 from MATH 191 to MATH 171. The prerequisites for MATH 301/305 will change from MATH 300 to “MATH 300 or STAT 213”
MATH 338: Content Literacy Exploration	No longer cross-list this course as MATH 338.	The content and outcomes of this course better align with the Teacher Education Program. It will remain listed as EDUC 338.
MATH 340: Secondary Math Methods	No change	
MATH 360: Modern Geometry	Add MATH 220 as a prerequisite	In reviewing course outcomes, we found that students who had taken MATH 220 significantly outperformed those who hadn't.
MATH 370: Real Analysis	No change	
MATH 371: Real Analysis II	No change	
MATH 375: Complex Analysis	No change	
MATH 380: Abstract Algebra I	Add WI designation	This course requires more writing, and more evaluation of writing, than our existing 395 and 396 courses.
MATH 381: Abstract Algebra II	No change	
WI-MATH 395: Undergraduate Seminar in Math	Remove WI designation	We will begin administering the Major Field Test in Mathematics to all our majors in this course. We feel other courses are more deserving of the WI designation.
WI-MATH 396 Undergraduate Seminar in Math	Eliminate	
MATH 399: Postsecondary Clinical Teaching Experience	Add	This course, created in response to student demand, gives our Math Education majors hands-on, supervised teaching experience. It allows our faculty to identify/remediate content weakness prior to student teaching.
MATH 400: Topics in Mathematics	No change	
MATH 490: Independent Study in Math	Eliminate	This course has not been offered recently. We use MATH 400 for independent study-type courses.

As the table shows, we are proposing to eliminate 10 courses, change the names of 4 courses, remove a MATH cross-listing from 1 course, remove the WI designation from 1 course, add the WI designation to 1 course, and add 3 courses (one of which EPC already approved for the Teacher Education Program in 2010). As a result, 8 fewer courses will be listed under the Mathematics Department in the Catalog:

Current	Proposed
091: Fundamentals of Math Workshop	
095: Intermediate Algebra	
096: Intermediate Algebra Workshop	
101: Orientation to College Math	099: Developmental Mathematics
131: Math for Liberal Arts	QUANT 113: Applied Probability
151: College Algebra	QUANT 131: Thinking Mathematically
152: Trigonometry	152: Trigonometry
161: Mathematics for Business/Economics	
171: Elementary Functions	171: Elementary Functions
191: Calculus & Analytic Geometry I	191: Calculus & Analytic Geometry I
192: Calculus & Analytic Geometry II	192: Calculus & Analytic Geometry II
210: Theory of Arithmetic	210: Theory of Arithmetic
WI-220: Introduction to Logic & Proof	211: Math Concepts for Teachers
230: Topics in Mathematics	WI-220: Introduction to Logic & Proof
280: Engineering Math	
290: Elementary Linear Algebra	290: Elementary Linear Algebra
291: Calculus & Analytic Geometry III	291: Calculus & Analytic Geometry III
300: Probability & Statistics I	MATH/STAT 300: Modern Probability & Statistics
301: Probability & Statistics II	MATH/STAT 301: Regression & General Linear Model
305: Data Analysis	MATH/STAT 305: Modern Data Analysis
320: Ordinary Differential Equations	320: Ordinary Differential Equations
338: Content Literacy	
340: Secondary Math Methods	340: Secondary Math Methods
360: Modern Geometry	360: Modern Geometry
370: Real Analysis I	370: Real Analysis I
371: Real Analysis II	371: Real Analysis II
375: Complex Analysis	375: Complex Analysis
380: Abstract Algebra I	WI-380: Abstract Algebra I
381: Abstract Algebra II	381: Abstract Algebra II
WI-395: Undergraduate Seminar in Mathematics I	395: Undergraduate Seminar in Mathematics
WI-396: Undergraduate Seminar in Mathematics II	
400: Topics in Mathematics	399: Postsecondary Clinical Teaching Experience
490: Independent Study in Mathematics	400: Topics in Mathematics

Acknowledge and examine the impact of these changes on other programs. Affirm the department has consulted with other programs that may be affected by changes.

The attached “Mathematics Department Proposals” provides a more detailed investigation of the impact of these changes on other programs. Affirmations that we have consulted with other programs may be found on pages 20-22. The following table provides a summary:

Proposed Change	Impact	Consultation with other programs
Reduce computer science requirements for Math Education majors from 6 credits to 3 credits of a programming language.	Will slightly reduce enrollment in CSCI 120. Will reduce Math Education major credit requirements by 3, possibly allowing these students to take an additional course. State teaching requirements are still met. This will require an update to the Catalog.	See statement from Chair of Computer & Information Sciences Department (p. 5)
Replace “3 courses from MATH 291, 301 or 305, 320, 370, 380, 400” with “MATH 301, 370, & 380”	Specifying courses for Math Education majors will result in greater consistency of student learning. This will also reduce the number of under-enrolled courses we offer and simplify course scheduling.	
Require Math Education majors to complete MATH 395 and MATH 399	In effect, we are replacing MATH 338 and a CSCI elective with MATH 395 and 399. This does not increase credit requirements for our majors. It does allow us a greater chance to identify and remediate content weaknesses of our math education majors.	
No longer cross-list EDUC 338 as MATH 338	MATH 338 never had mathematics student learning outcomes; it's better represented with the EDUC prefix.	See statement from Director of Teacher Education Program (p. 5)
Require Math Education majors to earn B or better in MATH 191, 192	Math Education majors must already maintain a 3.0 Math GPA before being accepted into the Teacher Education Program. This would ensure our students meet admissions standards for the TEP.	See statement from Director of Teacher Education Program (p. 5)
Require Math majors to take MATH 291; eliminate one elective	This will strengthen enrollment in our MATH 291 course and improve the preparation of our Math majors.	
Eliminate WI-MATH 396	Eliminating this 1-credit course offsets a 1-credit increase due to requiring MATH 291. Outcomes in this course were inadequate.	
Eliminate institutional “mathematical reasoning” requirement.	This will clarify that the institutional graduation requirement is the same as the General Education outcome, “Use quantitative information to solve problems.” Courses meeting the mathematical reasoning requirement also meet the General Education outcome, so this should have no immediate impact. This may allow other departments to offer courses meeting the GenEd outcome. It may also encourage other departments to evaluate the math courses they identify as prerequisites for their courses. This will require a Catalog update.	See statement from Director of General Education (p. 20)
Modify the institutional math placement standards.	The proposed placement standards align with ACT recommendations and ensure students are prepared for math courses. While fewer students will be placed into college-level math courses, more students will be placed into courses that fulfill the quantitative reasoning GenEd outcome.	See statement from Maureen Baldwin (p. 20)
	For students majoring in programs that require math courses, this may increase the number of credits needed to fulfill requirements. Students in these programs who have ACT Math scores between 18-21 will be required to complete MATH 099 before taking a college-level math course.	We have discussed this proposal with the Director of General Education, CIRCAS, the College of Business, the VPAA, ACCEL, and the Director of the Student Success Center -- no one has notified us with any objections to this change.
Change AP Calculus exam credits awarded	For students majoring in programs that only require GenEd outcomes to be met (no specific math courses), this may reduce the number of credits needed to meet graduation requirements.	See statement from Maureen Baldwin (p. 20)
	This will reduce credits awarded to some students who completed AP Calculus in high school. It will better reflect the content they learned in Calculus and better prepare students for math courses.	

Proposed Change	Impact	Acknowledgement of consultation
Eliminate MATH 091, 096, 101	These ACCEL-only courses will be replaced with MATH 099. This should simplify advising of ACCEL students.	See statement from ACCEL (p. 20)
Eliminate MATH 095	This course will be replaced with MATH 099. It should have no impact other than having students complete an online course rather than an online-supplemented course.	See statement from Maureen Baldwin (p. 20)
Add MATH 099	This online course replaces MATH 091, 095, 096, and 101. It should simplify advising and better prepare students for college-level courses. This online course will also allow the Department to serve more students more effectively with fewer resources.	Jim Van Speybroeck has consulted with IT and worked under the SAU distance learning policy.
Add QUANT 113	This course, if allowed as a prerequisite for STAT 213, will allow a greater number to take STAT 213 without requiring 6 math credits beforehand. Since we're eliminating MATH 161, this course will require no additional staffing resources.	We have met with the STAT 213 group to discuss this course and how it can complement STAT 213.
Change MATH 131 to QUANT 131	This change will clarify that this course addresses the "quantitative problem solving" General Education outcome.	
Eliminate MATH 151 before Fall 2013	Several programs/courses identify MATH 151 as a requirement/prerequisite. MATH 171, which combines outcomes from 151/152 in a more logical framework, could replace MATH 151 for these programs/courses. We will give all programs 2 years to choose a replacement for MATH 151. During this time, we will continue to encourage departments to identify student learning outcomes they want from a math course and to propose any new courses they need.	We have met and discussed this issue with the College of Business, the Nursing Program, ACCEL, and the College of Arts & Sciences CIRCAS.
Eliminate MATH 161	This course, which suffered from low enrollment, was an option for students within the College of Business. The COB no longer requests that we offer this course.	See statement from the Dean of the College of Business (p. 20)
Change EDUC 317 to MATH 211	This change better reflects the content and level of the course. The TEP and Math Department will continue to discuss options for staffing this course.	See statement from the Director of the Teacher Education Program (p. 5)
Reduce MATH 200 prreq. from 191 to 171	MATH 220 does not require any Calculus-specific skills, so we do not need MATH 191 as a prerequisite.	
Eliminate MATH 230	This class has not been offered recently.	
Eliminate MATH 280	Engineering majors will take MATH 290 and MATH 320.	See email from Chair of Engineering/Physics (p. 22)
Rename and cross-list MATH 300, 301, 305 as STAT 300, 301, 305	This should have no impact other than better reflecting the content of courses. The proposed prerequisite changes will allow more students to enroll in the course (especially students who complete STAT 213)	
Add MATH 220 prreq. to MATH 360	MATH 360: Modern Geometry is an axiomatic course that requires students to have skills in logic and proof. This change will help us achieve course outcomes.	
Add WI designation to MATH 380	This course, required by all our majors, better reflects an intensive mathematical writing course.	See statement from WI Coordinator (p. 20)
Refocus MATH 395	In this course, we will administer the Major Field Test in Mathematics to our Math and Math Education majors. Students scoring above the national average will receive a letter from the Department Chair, which they can use in applying for employment or graduate school. The MFT costs \$25 per student, so we will evaluate whether we need to add a course fee.	
Add MATH 399 for Math Education majors	In this clinical course, Math Education majors will work with Math Department faculty to plan, teach, and assess lessons in lower-level MATH courses. Students will write detailed reflections on their teaching, identifying and remediating content weakness.	
Eliminate MATH 490	This class has not been offered recently.	

Confirmation letter from the department chairperson that they have reviewed and signed off on each of the syllabi and course summary sheets for existing courses by completing the table below.

The √ symbols in the table below signify that I have reviewed the course summary sheets and syllabi. We continue to develop and revise course syllabi.

-- Brad Thiessen

Course	Approved summary sheet on file	Approved syllabus on file
MATH 099: Developmental Mathematics	√ (new course)	
QUANT 113: Applied Probability	√ (new course)	√
QUANT 131: Thinking Mathematically	√	√
MATH 151: College Algebra	√	√
MATH 152: Trigonometry	√	√
MATH 171: Elementary Functions	√	√
MATH 191: Calculus & Analytic Geometry I	√	√
MATH 192: Calculus & Analytic Geometry II	√	√
MATH 210: Theory of Arithmetic	√	
MATH 211: Mathematics Concepts for Teachers	√	√ (approved as EDUC 317)
WI-MATH 220: Introduction to Logic & Proof	√	
MATH 280: Engineering Math	√	√
MATH 290: Elementary Linear Algebra	√	
MATH 291: Calculus & Analytic Geometry III	√	√
MATH/STAT 300: Modern Prob. & Stat.	√	√
MATH/STAT 301: Regression & the GLM	√	√
MATH/STAT 305: Modern Data Analysis	√	√
MATH 320: Ordinary Differential Equations	√	√
MATH 340: Secondary Math Methods	√	√
MATH 360: Modern Geometry	√	√
MATH 370: Real Analysis I	√	√
MATH 371: Real Analysis II	√	
MATH 375: Complex Analysis	√	
WI-MATH 380: Abstract Algebra I	√	√
MATH 381: Abstract Algebra II	√	
MATH 395: Undergraduate Seminar in Math	√	√
MATH 399: Postsecondary Clinical Teaching Experience	√ (new course)	
MATH 400: Topics in Mathematics	√	√

Letter of support from the Dean of the College.

(We have just finished developing our proposals. This letter will be attached as soon as Aron Aji has had a chance to review our program review and proposals)

Letter of support from the Director of General Education.

(We have just finished developing our proposals. This letter will be attached as soon as Father Bud has had a chance to more fully review our current and proposed General Education offerings)

Letter of support from the WAC Coordinator.

(We have just finished developing our proposals. This letter will be attached as soon as Michael Hustedde has had a chance to more fully review our current and proposed writing intensive courses)

Letter of support from Maureen Baldwin.

I have met with Brad Thiessen and reviewed the proposals presented in this program review. The Student Success Center looks forward to working more closely with the Math Department as we implement and evaluate the proposed changes to math placement standards, developmental math courses, and General Education math courses.

-- Maureen Baldwin (email from 9/26/11)

Letter of support from ACCEL.

John Cooper, Regina Matheson, Laurie Harrison, and I met with Brad Thiessen on 9/22 to review the proposals presented in the program review that effect the ACCEL Programs (BBA, BBA.ACCT, BAMS, BES, BSS, and RN-BSN). The proposals should have a minimal impact on the ACCEL programs, but we look forward to working closely with the Math Department to implement and evaluate these proposed changes.

Thank you,

Ruth Soedt, ACCEL Program Director (email from 9/26/11)

Letter of support from College of Business.

(We have just finished developing our proposals. This letter will be attached as soon as the College of Business has had a chance to more fully review our proposals)

Affirm the department has consulted with other programs that may be affected by changes.

In developing and evaluating our proposals, the Math Department tried to meet with as many individuals and groups across campus as possible. The following list shows the formal meetings we scheduled to discuss our proposals and solicit feedback. We asked each of these groups to provide a statement of support for our proposals.

ACCEL - 9/10, 9/22/11: Met with Ruth Soedt, John Cooper, & Regina Matheson discuss impact of proposals on ACCEL students

CIRCAS - 5/11: Met to discuss proposals for placement standards, developmental math, and GenEd courses

College of Business - 3/8/11: Met with Dean & Directors to discuss proposals for placement and MATH 151/161

Engineering - 10/21/11: Received email requesting elimination of MATH 280

General Education - 8/12/11: Met with Fr. Bud to discuss proposals for placement, developmental, and GenEd courses

IT - 3/4/11: Met with Mary Heinzman to discuss ideas for placement testing

SSC - 6/30, 7/4, 8/29/11: Met with Maureen Baldwin discuss proposals for placement standards, developmental math, & GenEd courses

STAT 213 Group - 8/24/11: Email sent notifying group of proposals for placement, MATH 151, and QUANT 113

10/5/11: Met with STAT 213 group to discuss proposals for placement, MATH 151, and QUANT 113

STEM Chairs - 9/19/11: Met to discuss all proposals

TEP Director - 6/29, 9/7, 9/26/11: Met with Judith White to discuss proposals for math education majors, EDUC 338, & MATH 399

TEP Math - 3/25/11: Met with Tanya Volkova to discuss elementary math endorsement ideas (goals for next program review)

WAC - 7/21/11: Met with Michael Hustedde to discuss proposals for WI-courses

Upon request, we can provide emails documenting that these meetings were held.

From: Mike Opar <oparmichaele@sau.edu>
Subject: Discussions regarding ABET
Date: October 21, 2011 2:19:21 PM CDT
To: Thiessen Bradley A <ThiessenBradleyA@sau.edu>
Cc: Hill Thomas W <HillThomasW@sau.edu>, Prosise Jodi F <ProsiseJodiF@sau.edu>, Aji Aron R <AjiAronR@sau.edu>

Brad,

In light of our recent ABET visit, the Industrial Engineering program (and ME program) propose the following curricular changes:

Eliminate from both IE and ME programs:

MATH280
ENGR250

Add to both IE and ME programs:

MATH 290
MATH 320
MATH 300

Rationale:

The ABET evaluators identified a program deficiency. 32 hours of Math and Basic Science are required for any engineering program. Based on how ABET categorizes our Math and sciences, we have only 28 hours in our current curriculum (2011-2013 catalog), falling 4 hours short of the minimum requirement.

The proposed changes will bring our Math and Basic Science hours to 33, exceeding the minimum requirement by ABET. Furthermore, these changes will better fit the Math department offerings, as the three courses are major requirements. This should help populate required Math courses, without creating any new courses, and eliminate a program specific course from your faculty loading (Math280). The MATH290 and MATH320 courses will better prepare our students for subsequent courses as well.

I would like to talk to you about these proposed changes and determine which semesters these courses should be offered.

Cheers,
Mike

APPENDIX A: Rationale for staffing requests

Math Department: Rationale for Request of Tenure-Track Line Replacement (9/9/10)

The Math Department requests a replacement for a tenure-track line beginning in the 2010-11 academic year. Replacing this line will help the Department to provide:

- 1) a sufficient number of sections/seats in Developmental & General Education courses to serve all students
- 2) a complete, high-quality curriculum to majors in mathematics, math education, industrial engineering, computer science, and physics
- 3) undergraduate research opportunities and advising for majors
- 4) innovative ideas to improve the mathematics achievement of students at all levels

At the end of last year, the Department lost one tenured Professor. Another visiting line is set to expire at the end of this academic year. If we do not replace these lines, the Math Department will not be able to provide an adequate number of Developmental, General Education, service, and major-specific courses.

Due to increases in efficiency, the number of credits and courses offered by the Department has remained relatively stable over the past 7 years (during which student enrollment has increased substantially). Last year, we offered 49 sections (155 credits; 2,291 student credit hours). This year, we will propose curricular changes to our Developmental and General Education offerings that will allow us to serve a greater number of students with only 43 sections per year (137 credits; 2,669 student credit hours).

If the lost tenure-track line is not replaced next year, we will need to spend \$53,100 - \$59,000 for overloads/adjuncts to cover 59 credits (43% of our total credits). This assumes our proposed curricular changes are approved. If our curricular changes are not approved, we will need to spend \$69,300 - \$77,000 for overloads/adjuncts to cover 77 credits (50% of our total credits). Having 50% of our courses taught by adjuncts (or using overloads) will have an immediate negative impact on our course offerings and student achievement.

We cannot offer enough seats of Developmental, General Education, service, and major courses if this tenure-track position is not replaced. Losing this position will also make it impossible to develop, implement, and assess significant curricular changes to improve our Department's offerings.

Replacing the lost tenure-track line will allow us to cover 102 of our 137 course credits without overloads/adjuncts, saving us \$18,000 - \$24,000 each year. Replacing both the tenure-track and visiting line will allow us to cover 126 of our 137 course credits without overloads/adjuncts, saving an additional \$21,600 - \$25,000 each year.

The following table demonstrates these cost savings by displaying staffing levels, courses/credits offered, and overload/adjunct costs for the 2003-04, 2007-08, and 2009-10 academic years. Three projections are made for the 2010-11 academic year: one assuming we do not replace our tenure-track or visiting lines; another assuming we replace our tenure-track line; and another assuming we replace both the tenure-track and visiting lines.

	2010-11 Projections				(not changing from 2009-10)
	2003-04	2007-08	2009-10	(without replacing the tenure-track or visiting lines)	
				(replacing the tenure-track line; not the visiting line)	
Tenure-track faculty (FTE)	5.00	4.00	2.75	2.75	3.75
Instructional Staff	0.50	1.75	0.75	0.75	0.75
Visiting Lines	0.00	0.00	2.00	0.00	1.00
Total FTE	5.50	5.75	5.50	4.50	5.50
			(-2.00 FTE)	(-1.00 FTE)	(no change from 2009-10)
Courses (credits) offered*	48 (152 cr)	49 (155 cr)	43** (137 cr)	43** (137 cr)	43** (137 cr)
Courses (credits) covered without overload/adjunct	43 (129 cr)	45 (135 cr)	42 (126 cr)	26 (78 cr)	34 (102 cr)
Overload/Adjunct courses (credits)	3 (17 cr)	7 (29 cr)	17 (59 cr)	9 (35 cr)	1 (11 cr)***
Cost of overload/adjunct	\$15,300- \$17,000	\$26,100- \$29,000	\$53,100- \$59,000	\$31,500- \$35,000	\$9,900- \$10,000

* Does not include MATH 210 or independent studies

** This assumes proposed curricular changes will be approved. If changes are not approved, the Department will need to offer approximately 49 courses (credits) next year.

*** 11 credits due to labs in 8 sections -- MATH 191 (3), 192 (3), 280 (1), and 291 (1)

Proposed job description:

The St. Ambrose University Department of Mathematics seeks an Assistant Professor, tenure-track, to teach a full range of undergraduate mathematics courses, both for General Education and the major. Specialization is open, but preference will be given to candidates whose mathematical interests complement those of current faculty. Successful candidates will show a commitment to quality undergraduate teaching, student learning, scholarly engagement, and University service. Position begins in August 2011. Required: ABD in Mathematics or Applied Mathematics. Ph.D. required for tenure.

St. Ambrose University is a Catholic, liberal arts, diocesan university that emphasizes excellence in teaching and ongoing professional development. Total institutional enrollment is over 3,700 students. Located in Davenport, Iowa, one of the Quad Cities, St. Ambrose is a vibrant and diverse metropolitan area with a population of more than 350,000. The Mississippi River joins the two-state community, creating a very affordable and culturally rich urban setting distinguished by friendly people and unique river vistas. **Review of applications will begin in January and continue until the position is filled.** Please send cover letter, vita, three letters of reference and recent teaching evaluations to the Director of Human Resources, St. Ambrose University, 518 W. Locust Street, Davenport, IA 52803. AA/EEO

Math Department: Rationale for Request of Extension of Visiting Line (9/9/10)

The Math Department requests a 3-year extension to our Visiting line, beginning in the 2010-11 academic year. This line is needed to continue offering the current amount of Developmental, General Education, service, and major courses.

Extending this visiting line will provide the following benefits to students, the Math Department, and the University:

- 1) Extending this line will help us maintain a sufficient number of sections/seats in Developmental & General Education courses to serve all students
- 2) Extending this line will allow us to make significant curricular changes. These curricular changes will improve student achievement, increase the number of students we can serve, reduce the number of sections we offer each year, and reduce our reliance on overloads/adjuncts. We anticipate these changes will save at least \$37,800.
- 3) Extending this line will allow us to implement and evaluate a comprehensive assessment system, including placement testing and common assessments across our Developmental and General Education courses.
- 4) Extending this line will allow us to continue to develop ideas for curricular improvements and interdisciplinary collaboration opportunities.

At the end of this year, a 3-year visiting line in the Math Department is set to expire. This visiting line has allowed us to offer an adequate number of courses (Developmental, General Education, service, and major courses).

Over the past 3 years, the visiting line has led to substantial improvements within the Department, including the adoption, implementation, and evaluation of online-assisted instruction in our Developmental courses; curricular changes in General Education courses; and improved coordination of departmental assessment efforts. Without an extension of this visiting line, the Department may not be able to implement significant curricular improvements.

This year, the Department is proposing improvements to its placement procedures and courses at the Developmental and General Education levels. These proposals will allow us to serve a significantly greater number of students while offering 6 fewer sections each year. The proposals will also improve student achievement, not only of the General Education outcome (use quantitative information to solve problems), but also of skills that are prerequisites for courses in other departments. These proposals cannot be implemented unless our current staffing levels are maintained.

Last year, the Math Department offered 49 total sections (155 credits; 2,291 student credit hours). With the proposed curricular changes, we expect to be able to serve more students while only offering 43 total sections (137 credits; 2,669 student credit hours). If the visiting line is extended, we can make these curricular changes and serve all students while minimizing our use of overloads/adjuncts (11 overload/adjunct credits; \$9,900 - \$11,000 total cost). If the line is not extended, we will not be able to manage our curricular changes and we will need overloads/adjuncts to cover 53 credits next year (34% of our total credits offered). This will mean spending \$47,700 - \$53,000 on overloads/adjuncts each year. Thus, the cost of not extending the visiting line will be an additional \$37,800 - \$42,000 in overloads/adjuncts each year.

	2010-11 Projections				(not changing from 2009-10)
	2003-04	2007-08	2009-10	(not extending the visiting line)	
Tenure-track faculty (FTE)	5.00	4.00	2.75	3.75	3.75
Instructional Staff	0.50	1.75	0.75	0.75	0.75
Visiting Lines	0.00	0.00	2.00	0.00	1.00
Total FTE	5.50	5.75	5.50	4.50	5.50
			(-1.00 FTE)	(-1.00 FTE)	(no change from 2009-10)
Courses (credits) offered*	48 (152 cr)	49 (155 cr)	43** (135 cr)	49** (155 cr)	43*** (137 cr)
Courses (credits) covered without overload/adjunct	43 (129 cr)	45 (135 cr)	42 (126 cr)	26 (78 cr)	42 (102 cr)
Overload/Adjunct courses (credits)	3 (17 cr)	7 (29 cr)	17 (59 cr)	9 (35 cr)	1 (11 cr)***
Cost of overload/adjunct	\$15,300- \$17,000	\$26,100- \$29,000	\$53,100- \$59,000	\$31,500- \$35,000	\$9,900- \$10,000

* Does not include MATH 210 or independent studies

** Without an extension of the visiting line, curricular changes cannot be implemented

*** This assumes proposed curricular changes will be approved (to serve more students with 6 fewer sections)

*** 11 credits due to labs in 8 sections -- MATH 191 (3), 192 (3), 280 (1), and 291 (1)

Proposed job description:

The St. Ambrose University Department of Mathematics seeks a Visiting Faculty position to coordinate online-assisted Developmental Math courses, teach undergraduate General Education courses in mathematics, and coordinate assessment of student placement and achievement in Developmental courses. Successful candidates will show a commitment to student learning and innovative undergraduate teaching. Position begins in August 2011. Required: Masters Degree in Mathematics, Mathematics Education, or related Discipline. Experience with online course development, management, and assessment preferred.

St. Ambrose University is a Catholic, liberal arts, diocesan university that emphasizes excellence in teaching and ongoing professional development. Total institutional enrollment is over 3,700 students. Located in Davenport, Iowa, one of the Quad Cities, St. Ambrose is a vibrant and diverse metropolitan area with a population of more than 350,000. The Mississippi River joins the two-state community, creating a very affordable and culturally rich urban setting distinguished by friendly people and unique river vistas. **Review of applications will begin in April and continue until the position is filled.** Please send cover letter, vita, three letters of reference and recent teaching evaluations to the Director of Human Resources, St. Ambrose University, 518 W. Locust Street, Davenport, IA 52803. AA/EEO

We envision the following workload for this position:

Managing the online Developmental Math course (MATH 099) each semester, including development/maintenance of the course syllabus, online course system, student assessment, student grading. This would also include coordinating any face-to-face meetings with students and coordinating efforts with tutors in the Student Success Center.

Teaching two General Education math sections each semester.

Coordinating the collection and reporting of results from student placement testing and the assessment of Departmental General Education courses. While this would not include developing, administering, or scoring assessments, it would include collecting, synthesizing, and reporting assessment results from our General Education courses.

Assessment of the Department and its Programs

- A) Explain how your stated learning outcomes are appropriate to your mission, programs, degrees, and students.

In an effort to incorporate the revised SAU mission and better reflect ongoing departmental activities for majors and non-majors, the departmental mission has been revised:

Old Mission Statement:

The mission of St. Ambrose University is to enable all its students to develop intellectually, spiritually, ethically, socially, artistically and physically to enrich their own lives and the lives of others. To assist in that goal, the Department of Mathematical Sciences has the additional mission of providing its majors with the opportunity to develop a deep understanding of the core concepts of mathematics and to prepare them for graduate school or for careers in mathematics, mathematics teaching, or related fields.

New (proposed) Mission Statement:

St. Ambrose University – independent, diocesan and Catholic – enables its students to develop intellectually, spiritually, ethically, socially, artistically and physically to enrich their own lives and the lives of others. To support this mission, the **Mathematics Department provides all students opportunities to develop mathematical and quantitative skills to model systems and solve problems. The Department provides its majors with a deep understanding of mathematical concepts and mastery of problem-solving skills to prepare them for immediate employment or enrollment in graduate/professional programs.**

Likewise, the teaching objectives used to fulfill this mission have been revised to reflect the various goals of courses designed for General Education, mathematics majors, and mathematics education majors.

Old Teaching Objectives:

1. To provide majors with practical and theoretical knowledge of mathematics at an advanced level
2. To provide majors high quality courses that will extend their understanding of mathematics
3. To provide courses in mathematics education consistent with best practices
4. To develop in our majors the logical skills necessary for creative problem solving, analysis, and research
5. To develop the majors' abilities to write and speak effectively in their discipline

New (proposed) Faculty Objectives:

Teaching General Education courses:

1. To provide all students mathematical concepts and problem-solving skills appropriate to their discipline.
2. To provide all students an appreciation for mathematics.

Teaching courses for mathematics majors:

1. To provide majors high quality, rigorous coursework that will extend their practical and theoretical understanding of mathematics.
2. To provide majors opportunities to master skills in problem solving, analysis, and research.
3. To provide majors opportunities to develop the ability to communicate effectively in their discipline

Teaching courses for mathematics education majors:

1. To provide pre-service teachers with courses consistent with state teaching standards, NCTM standards, and best practices in math education.
2. To ensure pre-service teachers have mastered concepts and skills beyond what they will be expected to teach.

Professional development and service:

1. To keep current in our disciplines.
2. To encourage undergraduate research opportunities.
3. To assist our students in seeking employment or admissions to graduate programs
4. To provide ongoing mentoring and in-service learning opportunities to practice mathematics teachers.

To better align with our new mission, our faculty objectives, our current course requirements, and best practices in mathematics education, our student learning objectives have been revised.

2

Current Learning Objectives for Majors:

After completing the courses required for a major in mathematics at St. Ambrose University, all students will:

1. Understand the concepts and techniques of core subjects: calculus, linear algebra, analysis and statistics.
 2. Apply those core concepts and techniques to solve problems
 3. Understand the role of proof in mathematics and read/write elementary mathematical proofs
 4. Communicate mathematical ideas effectively using proper mathematical terms and notation.
- In addition, students majoring in mathematics education will:
5. Demonstrate knowledge of content and pedagogy
 6. Design coherent instruction.

New (proposed) student learning objectives:

In completing the degree requirements, all **Mathematics Majors and Mathematics Education Majors** will:

1. Apply concepts and skills from Calculus and Linear Algebra to model and solve problems.
2. Read and write elementary mathematical proofs.
3. Analyze data using concepts and skills from probability and statistics to make appropriate decisions.
4. Locate, read, and assimilate technical material.
5. Communicate mathematical ideas and solutions using proper terms and notation.
6. Access and utilize relevant resources when solving problems.
7. Appreciate the career and educational opportunities for mathematics majors

All **mathematics majors** will also:

8. Apply concepts and skills from Differential Equations, Analysis, and Abstract Algebra to solve problems.
9. Produce concise and rigorous mathematical proofs.
10. Evaluate the completeness and correctness of proofs.

All **mathematics education majors** will also:

8. Locate, consume, and evaluate research in mathematics education.
9. Apply research-based strategies to plan, deliver, and evaluate effective instruction.
10. Demonstrate awareness of current local, state, and national mathematics standards and curricula

B) Present evidence that your students achieve your stated student learning outcomes

The assessment plan we proposed during our 2004-05 program review is displayed on pages 6-7 of this section. The table attempts to show how our actual assessment activities over the past 5 years have aligned with our proposed assessment plan. Proposed assessment activities that we did not accomplish are highlighted in ~~strike-through~~ font; additional assessment activities we conducted (beyond what we proposed in 2004-05) are highlighted in **bold**.

As the table shows, our actual assessment activities differed significantly from our proposed assessment plan. Reasons for these discrepancies include:

- The majority of our time and resources used to assess student learning were in areas we did not anticipate during our 2004-05 program review. While our program review was focused on the assessment of our majors, the vast majority of our time was spent assessing student preparation for, and learning in, our Developmental and General Education courses. This included the development and analysis of common unit and final exams in our Developmental courses (090, 095, 091/096/101 on-campus and in the ACCEL program); the development and analysis of placement, unit, and final exams for our General Education and entry-level courses (131, 151, 161, 171, and 191); and continuing analyses of our methods for placing incoming students into math courses. To accomplish these assessment activities, faculty meet at the beginning of each semester to plan the assessment of student learning in these Developmental and General Education courses. During the first week of classes, instructors administer placement tests to students in these courses. Following this placement exam and each unit exam, faculty meet to discuss and norm the results. These results are then pooled in the comprehensive analysis of the effectiveness of our placement methods. None of these assessment activities were included in our 2004-05 assessment plan. Our inability to anticipate which aspects of our Department will require the greatest assessment resources will inform the assessment plan we propose in this program review.
- Likewise, our 2004-05 proposed assessment plan did not encourage flexibility in investigating the use of new assessments. For example, we have administered the standardized ARTIST CAOS (Comprehensive Assessment of Outcomes in a 1st Statistics course) to majors in MATH 300 for the past 3 years. This assessment instrument was developed in 2006, so did not appear in our assessment plan. Likewise, our assessment plan did not encourage us to actively investigate the Major Field Tests from ETS. Our department would be better served by an assessment plan that encouraged flexibility in the choice of assessment.
- While we did administer all of our proposed assessments (unit exams, seminar/course projects, proofs, field experience evaluations, sample lesson plans) and maintained copies of these assessments, we did not systematically collect and analyze the results of these assessments. This is, in large part, due to our lack of a convenient database for storing assessment results. While we continuously review assessment results informally at faculty meetings, we have not developed a central warehouse for maintaining student learning data. To systematize our data collection and analysis, we have begun to investigate using Google documents as a shared database to collect, share, maintain, and analyze assessment data.
- Our 2004-05 proposed assessment plan did not provide any details regarding the specific assessments to be used, criteria for determining success, or logistics for collecting and analyzing the data. Our department would be better served by an assessment plan that better defined the assessments, scoring criteria, and methods to be used in measuring student learning.

Beginning on page 8, we present assessment results that we have managed to systematically maintain since our last program review.

Assessment Plan proposed in the 2004-05 program review document:

Learning Objective	Assessment	Timeline & Responsibilities		
		Administration	Collection	Analysis/Criteria
1. Understand the concepts and techniques of core subjects: calculus, linear algebra, analysis, and statistics.	1. Unit exams written to a common table of specifications (common course objectives), when applicable	1.Exams in MATH 191, 192, 290, 300, 320, 370.	1.A copy of each unit exam and a record of student scores will be maintained.	1.Score distributions and pass rates will be examined longitudinally by faculty teaching the courses
	2. Seminar projects	2.Written projects and presentations assigned in the seminar course, MATH 395-6	2. Students will maintain a portfolio of their seminar projects.	2. Since math majors will take the seminar course at least twice, individual student growth will be informally monitored. Projects will be evaluated for clarity and correctness by faculty and peers.
	3. ARTIST CAOS (40-item Comprehensive Assessment of Outcomes in a 1 st Statistics course)	3. Standardized assessment administered in MATH 300	3. Score distributions will be maintained by course instructor.	3. Score distributions will be analyzed longitudinally and against national norms.
	4. Course grades	4. Grades from MATH 191, 192, 290, 300, 320, 370.	4. Grade distributions will be obtained from the Registrar.	4. Grade distributions will be analyzed longitudinally.
2. Apply those core concepts and techniques to solve problems	1. Unit exams written to a common table of specifications (common course objectives), when applicable	1.Exams in MATH 191, 192, 290, 300, 320, 370.	1.A copy of each unit exam and a record of student scores will be maintained.	1.Score distributions and pass rates will be examined longitudinally by faculty teaching the courses
	2. Seminar projects	2.Written projects and presentations assigned in the seminar course, MATH 395-6	2. Students will maintain a portfolio of their seminar projects.	2. Student growth will be informally monitored. Projects will be evaluated for clarity and correctness by faculty and peers.
	3. ARTIST CAOS (40-item Comprehensive Assessment of Outcomes in a 1 st Statistics course)	3. Standardized assessment administered in MATH 300	3. Score distributions will be maintained by course instructor.	3. Score distributions will be analyzed longitudinally and against national norms.
	4. Course grades	4. Grades from MATH 191, 192, 290, 300, 320, 370.	4. Grade distributions will be obtained from the Registrar.	4. Grade distributions will be analyzed longitudinally.

Bold font = assessment activities that did not appear in our 2004-05 assessment plan

~~Strike-through~~ = proposed assessment activities we did not accomplish

Learning Objective	Assessment	Timeline & Responsibilities		
3. Understand the role of proof in mathematics and read/write elementary mathematical proofs	1. Proofs	1. Proofs in MATH 220, 360, 370, 380	1. Students will maintain a portfolio of their written proofs. Samples of proofs written by students will be collected. 2. Students will present proofs to groups of faculty	1. Proofs will be evaluated for clarity and correctness by faculty
4. Communicate mathematical ideas effectively using proper mathematical terms and notation	1. Seminar projects 2. Proofs 3. Course projects	1. Written projects and presentations assigned in the seminar course, MATH 395-6. 2. Presentation of Proofs in MATH 220, 360, 370, 380 3. Data analysis projects assigned in MATH 300, 301, 305.	1. Students will maintain a portfolio of their seminar projects. 2. Students will maintain a portfolio of their written proofs. Samples of proofs written by students will be collected 3. Samples of student projects will be maintained.	1. Projects will be evaluated for clarity and correctness by faculty and peers 2. Proofs will be evaluated for clarity and correctness by faculty 3. Projects and presentations will be evaluated for clarity and correctness.
5. Demonstrate knowledge of content and pedagogy	1. Course exams, projects, and assignments	1. MATH 210, MATH 340	1. Students will maintain copies of their course projects and assignments	1. These assignments are primarily used as a source of feedback to students.
6. Design coherent instruction	1. Field experience (student teaching) observations and evaluations 2. Sample lesson plans developed	1. MATH 210, MATH 340 2. MATH 210, MATH 340	1. Students will maintain a portfolio of field experiences. Students will also receive an evaluation form. 2. Students will maintain a portfolio of sample lesson plans	1. Direct observation of student teaching 2. Quality of lesson plans will be evaluated.

Bold font = assessment activities that did not appear in our 2004-05 assessment plan

Strike through = proposed assessment activities we did not accomplish

Results from our assessment of student learning objectives (SLOs):

SLO(s): Understand the concepts and techniques of core subjects: calculus, linear algebra, analysis and statistics
Apply those core concepts and techniques to solve problems

Assessment: MATH 300/301 exam scores

In MATH 300 and MATH 301, students are administered three interim exams designed from the course objectives in each unit. While most of the items on the exams differ from year-to-year, 10 common items appear on each exam in order to track results longitudinally. Average percent correct scores on the exams and these 10 common items are displayed in the following table:

Results:

MATH 300	Unit 1 (common items)	Unit 2 (common items)	Unit 3 (common items)
2006	71% (70%)	69% (56%)	59%* (64%)*
2007	81% (76%)	77% (68%)	77% (72%)
2008	78% (85%)	79% (82%)	81% (78%)
MATH 301	Unit 1 (common items)	Unit 2 (common items)	Unit 3 (common items)
2006	69% (72%)	68% (74%)	73%* (75%)*
2007	72% (72%)	80% (82%)	70% (83%)
2008	81% (74%)	90% (80%)	72% (89%)
2009	76% (81%)	79% (88%)	60% (82%)*

* percentage includes 2 students who scored 0%

Discussion: While the actual distribution of course exam scores are more interesting, these average percent correct scores show that student performance on the 10 common items has increased over time for almost all assessments. This could indicate increasing levels of student ability (although overall test scores have not consistently increased), improved teaching, more focused teaching (teaching "to" the common items), or another cause. In analyzing these scores, one notable finding is that student performance has become more bimodal over time. In 2006-07, score distributions were approximately normal, with many students scoring near the average score. By 2008-09, these assessments are classifying students clearly into two groups – those who score very well or very poorly on the exams. Another trend of interest is that students have performed relatively well on conceptual items and relatively poorly on computational items.

SLO(s): Understand the concepts and techniques of core subjects: calculus, linear algebra, analysis and statistics
Apply those core concepts and techniques to solve problems

Assessment: ARTIST CAOS scores
In MATH 300 and MATH 301, a 40-item nationally normed online assessment is administered to all students. This assessment was developed as a standardized, norm-referenced assessment of learning in a student's first statistics course. The following tables display the average percent correct scores and the distribution of student scores:

Results:

CAOS	SAU students (in MATH 300)	National Norms	Difference
2007	79.4%	51.2%	+28.2%
2008	82.6%	53.4%	+29.2%
SAU student scores			
	0-10	11-20	21-30
2007	0	2	4
2008	1	1	3
			18

Number of students scoring between 0-10, 11-20, 21-30, or 31-40 items correct

Discussion: Because the national norms include (mostly) students who have not completed Calculus, our MATH 300 students should, perhaps, be expected to outscore the national norms. Compared to the national norms, MATH 300 students were more likely to answer each of the 40 test items correctly – even the conceptual items that require no mathematical ability. MATH 300 students score relatively strongest in items that require visualizations or group comparisons. MATH 300 students scored relatively weakest in items involving randomization methods.

SLO(s): Understand the role of proof in mathematics and read/write elementary mathematical proofs
Communicate mathematical ideas effectively using proper mathematical terms and notation

Assessment: Exams scores in MATH 220, 290, 380
Proofs presented to groups of faculty

Results: Not formally maintained

Discussion: Beginning a few years ago, faculty were invited to attend student presentations of proofs they had developed or assimilated. Following these presentations, faculty discuss student performance. We have not maintained a database of scores from these presentations.

SLO(s): Communicate mathematical ideas effectively using proper mathematical terms and notation

Assessment: Student projects and take-home assignments in MATH 300-301
In MATH 300 and 301, students are assigned projects and take-home assignments that require students to analyze data, explain their analysis, and write any conclusions they can make from their analysis. For purposes of course grading, these assignments are scored for the correctness of the analysis, explanation, and conclusions. For Departmental assessment purposes, these assignments are also scored for effective communication (clarity, grammatical correctness). The assignments are quickly assigned a score on a 4-point rubric (below, approaching, meets, or exceeds expectations). While students see these “communication scores,” these scores do not impact their grade on the assignment.

9

Results:

	Below	Approaches	Meets	Exceeds	Meets/Exceeds (Math only)
2006 MATH 300	38 (25%)	63 (41%)	34 (22%)	19 (12%)	34%
2007 MATH 301	23 (20%)	20 (18%)	41 (36%)	30 (26%)	62%
2007 MATH 300	46 (29%)	24 (14%)	62 (39%)	28 (18%)	57%
2008 MATH 301	16 (17%)	18 (20%)	27 (29%)	31 (34%)	63%
2008 MATH 300	42 (21%)	73 (36%)	60 (29%)	28 (14%)	43%
2009 MATH 301	36 (29%)	18 (14%)	43 (34%)	29 (23%)	57%
					88%

The number of assignments differ from year-to-year.

Numbers represent number of assignments that were assigned each score.

Discussion: The numbers show that, as a whole, students have big problems communicating their results effectively. In MATH 300, less than half of the assignments meet instructor expectations for clear communication. The good news is that by the time students move into MATH 301, their communication skills have improved (almost two-thirds of assignments in MATH 301 meet or exceed expectations). Based on informal evidence, the course instructor began in 2007 to analyze results separately for math/math education majors and all other majors. As the last column shows, nearly all math/math education majors communicate effectively on these assignments. The students majoring in Industrial Engineering, Computer Science, or other majors have struggled with communicating effectively.

SLO(s): Design coherent instruction

Assessment: Student Lesson Plans in MATH 340
In MATH 340, students develop several lesson plans that are evaluated in 4 dimensions. A holistic score is assigned to each lesson plan based on a 4-point rubric that defines expectations for pre-service teachers. The following table displays the number of students earning each score on the rubric for the first lesson plan they develop in the course (pre-lesson) and final lesson plan developed for the course (post-lesson):

Results:

	Below	Approaches	Meets	Exceeds
2007 Pre-lesson	1	4	3	
2007 Post-lesson		1	6	1
2008 Pre-lesson		1	1	1
2008 Post-lesson		1		2
2009 Pre-lesson		3	1	
2009 Post-lesson			4	

Discussion: With the small number of students in the course, it is difficult to generalize from this data. The data are more effectively used formatively to improve individual student performance.

SLO(s): Demonstrate knowledge of content and pedagogy

Assessment: Student Lessons in MATH 340

In MATH 340, students teach several lessons in front of their peers. The instructor and classmates evaluate the lesson on the 4-point rubric. The following table displays the distribution of scores assigned to students from the instructor and peers for a lesson taught at the beginning of the course (pre-lesson) and a lesson taught at the end of the course (post-lesson):

Results:

	Below	Approaches	Meets	Exceeds
2007 Pre-lesson	5	16	31	12
2007 Post-lesson		3	46	15
2008 Pre-lesson		2	5	2
2008 Post-lesson		3		6
2009 Pre-lesson		7	3	2
2009 Post-lesson		2	10	4

Discussion: With the small number of students in the course, it is difficult to generalize from this data. The data are more effectively used formatively to improve individual student performance. Note that students also receive evaluations from their practicum teachers.

SLO(s): (none)

Assessment: Job placement of our math education graduates

Another measure of our student learning outcomes can be found in the job placement of our graduates. The following table shows the number of

Results:

	Employed as teacher	Employed outside of teaching	In graduate school	Unknown
Secondary	12	2	3	4
Elementary	4			

Discussion: Our math education majors find jobs in education. A centralized data warehouse and alumni survey will enable us to better track our students after graduation.

C) Document how your department analyzes and uses evidence of student learning

As discussed in the previous section, our department has spent a great deal of time analyzing evidence of student learning for Developmental and General Education courses. We have not, however, developed a system to formally collect, analyze, and report evidence of student learning at a departmental level for our majors.

Some examples of how our department analyzes and uses evidence of student learning include:

- Developing and analyzing placement exams for our Developmental and General Education courses. From these analyses, we have recommended changes to the systems used to place students into entry-level courses (see appendix 11 for excerpts from the analysis). These results are also used to quickly advise students of the most appropriate course for them at the beginning of each semester.
- Results from the assessment of Developmental and General Education courses has led to staffing changes and a more-focused curriculum in MATH 095. Assessment results were also used to push for the development of MATH 091/096/101.
- Meeting after each unit exam in MATH 151 to discuss and norm results. This has lead to changes in the sequence of topics taught in the course.
- Assessment results have led to important discussions of the curricula in MATH 161, 171, and 191. These discussions have led to more focused assessment in these courses.
- Results from the ARTIST CAOS have led to significant changes in the curriculum of MATH 300 and 301 to incorporate more randomization/permuation/bootstrap methods.
- Our lack of a centralized database for recording student learning evidence has led to a trial of Google documents as our departmental data warehouse. This trial led to a shared database of MATH 151 exam scores.

D) Describe how your faculty members share responsibility for student learning and its assessment

Including the within-course assessment to which all faculty members contribute, our faculty share responsibility for assessing departmental and institutional outcomes. As described earlier, faculty members meet to plan, develop, administer, and share results from unit assessments in General Education courses.

E) Explain how you evaluate and improve your efforts to assess and improve student learning

Most of our evaluation and improvement efforts come from our faculty meetings where we discuss assessment results and student issues. Over the past five years, we have had major discussions about student learning, including placement testing, selection and sequencing of topics in Developmental and General Education courses, course staffing, course development, and student advising.

The preparation we put into our program review provides the best opportunity for us to comprehensively evaluate our assessment efforts (see page 5 of this assessment section). From this evaluation, we see the need for a flexible, focused assessment plan to guide our efforts for the foreseeable future. We also see the need for a centralized database for student assessment results.

In our previous program review, we stated that we evaluate our assessment plan by asking three sets of questions:

1. Is the current assessment plan comprehensive? Does it measure the learning objectives we value as a department? Do we need to change or add any assessments?
2. Is the current assessment plan realistic? Are we keeping up with the data collection and analysis? Are there additional sources of information currently available?

3. Is the current assessment plan yielding useful information? Do we have criteria to measure the level of success of our program? Are we using this information to improve the program? Are students receiving adequate feedback regarding their status and growth in the program?

Based on our experiences over the past five years, we can evaluate the 2004-05 assessment plan:

1. The assessment plan was comprehensive (in terms of assessing our SLOs), but did not specifically address our objectives. Also, our stated learning objectives did not align well with what we value as a department. The identified assessments were too vague and did not specify how the information would be collected. The assessment plan did not include criteria to determine our level of success.
2. The assessment plan was realistic, but not useful. Lacking a central place to hold the data, we did not keep up with data collection and analysis. The plan did not encourage flexibility in creating new (or significantly modifying existing) assessments.
3. The assessment plan did yield some information that was useful, but most of our useful information came from the assessment of General Education courses. We did not have criteria to measure the level of success of the program. Students may not be receiving adequate feedback regarding their status and growth in the program.

This evaluation guides the development of our proposed assessment plan.

F) Describe how you inform your various stakeholders (students, employers, accreditation agencies, etc.), both on and off campus, about what and how well your students are learning.

We do not do a great job of informing our stakeholders about student learning. Students receive feedback on assignments and tests in-class; otherwise, we do not actively communicate our assessment results.

IV. Outline of Department's plans, including assessment and evaluation methods, for the next five years based upon program review evidence.

Based on our experience with our 2004-05 assessment plan, we do not think setting a 5-year assessment plan is a worthwhile activity. A 5-year plan flexible enough to meet our evolving assessment priorities would not be specific enough to provide useful information. Also, a major-specific assessment plan would fail to focus on our General Education courses (which have the vast majority of our enrollment numbers).

Our department proposes to replace its 5-year assessment plan with a commitment to annual assessment updates. At the start of each academic year, our department will submit the following information to the University Assessment Coordinator:

1. A list of 3 outcomes we plan to assess during the academic year. Two of these outcomes will come from our list of student learning objectives. The third outcome may be related to Developmental/GenEd courses or our own faculty objectives.
2. For each outcome, we will provide the names of at least 2 assessment instruments.
3. For each assessment, we will provide some evidence supporting the quality of the chosen assessment along with logistics for how the assessment will be administered and how results will be analyzed. We will also provide criteria to which we will compare student performance.
4. For each outcome, we will provide a brief explanation of how we intend to use the results.

Then at the end of the academic year, we will submit another update to the University Assessment Coordinator. This update will include:

1. Results from each assessment identified the previous fall (the results may be placed on a common 4-point rubric).
2. A brief discussion of the results that may include comparisons across institutions, student subgroups, or time.
3. Changes we may decide to make, or resources we identify as needing, as a result of these assessment results.

A sample of this proposed assessment update is displayed on pages 14-15:

Mathematics Department Assessment Update:

13

Outcome #1: Analyze data using concepts and skills from probability and statistics to make appropriate decisions

Measure A: ARTIST CAOS

Assessment type: Direct; allows for external comparisons

Evidence of quality: See <https://app.gen.umn.edu/artist/caos.html>. This is a nationally-normed, 40-item, online assessment of outcomes from a student's first statistics course. Cronbach's alpha was estimated to be 0.77; validation evidence can be found online.

Logistics: The assessment will be administered during the final week of classes in MATH 300. Scores will be emailed to the course instructor and entered into a shared database for longitudinal analysis. Score distributions for math and non-math majors will be compared to the national norms. Areas of relative strength and weakness will be identified. Following administration, the exam items will be compared to course objectives to determine alignment. CAOS scores will count as an assignment grade for students in the course.

Criteria: Comparisons will be made to national norms. It is expected that students will outscore the norming group. Based on previous results, we expect students to answer 80% of the items correctly. All students should answer at least 30 of the 40 items correctly. Criteria for individual students will be:

- 00-19: Below expectations
- 20-29: Approaches expectations
- 30-37: Meets expectations
- 38-40: Exceeds expectations

Results: (to be provided at the end of the academic year)

Discussion: (to be provided at the end of the academic year)

Measure B: Randomization/bootstrap/permuation test activities (2 in MATH 300; 2 in MATH 301)

Assessment type: Direct; does not allow for external comparisons

Evidence of quality: The activities, designed collaboratively with statistics education researchers at the 2010 CATALYST workshop in San Francisco, align perfectly with course objectives. Internal reliability will be estimated from student scores. Scores will be correlated with CAOS scores to provide evidence of validity.

Logistics: During both MATH 300 and 301, students are assigned activities based on randomization/bootstrap/permuation methods. The activities require students to create visualizations of a dataset, develop competing hypotheses/models, explain how randomization methods can be used to test the hypotheses/models, analyze the data using those methods, and write conclusions from their analyses. Activities will be rated holistically on a 4-point rubric (below, approaching, meets, exceeds expectations).

Criteria: **Below expectations:** The visualization, hypotheses, explanation, analysis, and/or conclusions contain significant errors or are difficult to discern. One or more key components of the activity are not complete.

Approaching: The visualization displays the data. Hypotheses are written but may be inappropriate. The analysis method is not adequately explained. The analysis is complete, but may have computational errors. Some inappropriate conclusions are drawn

Meets: The visualization clearly displays the data. The hypotheses are appropriately written. The analysis method is explained and the analysis is correctly completed. Correct conclusions are drawn.

Exceeds: The visualization clearly displays interesting aspects of the data. The hypotheses use correct notation and are appropriately written. The analysis method is explained clearly and the analysis is correctly completed. All conclusions are correct and no incorrect conclusions are made.

Results: (to be provided at the end of the academic year)

Discussion: (to be provided at the end of the academic year)

Outcome #2: Read and write elementary mathematical proofs

Measure A: Exams in MATH 220

Assessment type: Direct; does not allow for external comparisons

Evidence of quality: Exams are written to align with course objectives. Samples of proofs will be evaluated by multiple faculty members to check rater reliability.

Logistics: MATH 220 course instructor will assign and evaluate proofs. Samples of proofs will be retained for future analysis. Scores will be entered into the shared database.

Criteria: Below expectations: The proof is not complete or correct.

Approaching: The proof contains minor errors or notational errors.

Meets: The proof is correct and uses correct notation.

Exceeds: The proof is correct and concise/elegant.

Results: (to be provided at the end of the academic year)

Discussion: (to be provided at the end of the academic year)

Measure B: Presentation of proofs in MATH 370

Assessment type: Direct; does not allow for external comparisons

Evidence of quality: Students will present proofs as part of the course objectives.

Logistics: MATH 370 will assign proofs to be presented by students. Students will present proofs to their classmates, course instructor, and other invited faculty members. Students will receive scores from their peers, course instructor, and invited faculty.

Criteria: Below expectations: The proof is incorrect.

Approaching: The proof is correct, but the explanation is incorrect or unclear.

Meets: The proof is correct, but the explanation needs improvement.

Exceeds: The proof is correct, concise, and clearly explained.

Results: (to be provided at the end of the academic year)

Discussion: (to be provided at the end of the academic year)

Outcome #3: Improve the accuracy of placing incoming students into math courses

Measure A/B: Placement exam / ACT scores

Assessment type: Direct; allows for external comparisons

Evidence of quality: Assessment items were chosen from a bank of items developed by a publishing company to align with developmental course objectives. Information about the ACT can be found at <http://www.act.org/>

Logistics: Placement exams will be given to all students during the first week of classes in MATH 095, 131, 151, 161, and 171. Scores on the placement exam will be later combined with ACT scores (and lists of math courses taken) to serve as predictors of student success. Student performance on their first course exam will serve as the measure of successful placement.

Criteria: Students earning a grade of C or better on the first exam will be classified as "accurately placed." Students earning D/F grades on the first exam will be classified as "inaccurately placed." Using logistic regression, the predictive potency of the placement exam and ACT scores will be estimated.

Results: (to be provided at the end of the academic year)

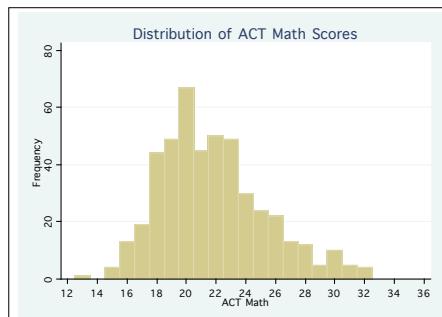
Discussion: (to be provided at the end of the academic year)

Math Placement Data Analysis

N = 477 students
43% = Male
57% = Female

Missing Data:
ACT MATH -- 18 missing cases (3.8%)
ACT COMP -- 18 missing cases (3.8%)
Of the 18 missing cases, 11 were male students

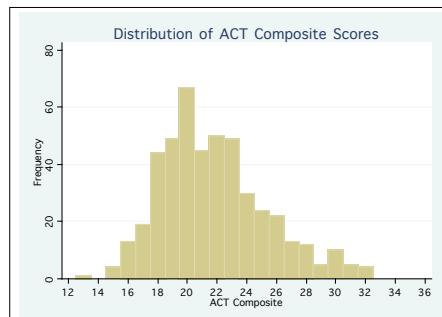
One student had a MATH ACT score of 1 and an ACT COMPOSITE of 17.
An estimated MATH ACT of 17 was substituted for this student.
Regression: MATH ACT = 0.54 + 0.94(COMPOSITE) = 0.54+0.94(17) = 16.52
All other ACT scores looked valid.



ACT MATH

Percentile	Score
5	16
10	16
25	17
50	20
75	24
90	27
95	28

Male Average = 21.23
Female Average = 20.93
(No significant difference in means or variances.)



ACT Composite

Percentile	Score
5	17
10	18
25	19
50	21
75	24
90	27
95	29

Male Average = 21.70
Female Average = 21.85
(No significant difference in means or variances.)

Essential Functions Worksheet

The Math Department has worked through the Essential Functions worksheet. We will attach the final version of the worksheet as soon as possible and then meet with Ryan Sadler.

1. Program Information:

Name of Department/Program: Mathematics

Academic year: 2011-12

Contact person: Brad Thiessen

List program faculty/staff and identify the contribution each individual made to this report: (press return/enter after entering each name or contribution)

Thomas Anderson	Developed assessment methods and recommended schedule
Ilwoo Cho	Developed assessment methods and recommended schedule
Tim Gillespie, Visiting	Will contribute assessment results (General Education and major courses)
Kathy Potter	Completed QUANT 131 assessment section
Hernando Tellez, Visiting	Developed assessment methods and recommended schedule
Brad Thiessen	Completed form; revised SLOs

2. Program Assessment:

Student Learning Outcomes	Assessment Tools/Methods	Academic year(s) of assessment					Assessment Results (due 7/1/2012)
		'11-12	'12-13	'13-14	'14-15	'15-16	
1. Demonstrate a breadth and depth of knowledge appropriate for a bachelor's degree in mathematics.	1. Major Field Test in Mathematics (administered in MATH 395) 2. Course exams will be reviewed by the Department to ensure they align with course outcomes and standards.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Results and brief explanation/discussion
2. Persevere in modeling and solving routine, non-routine, and applied problems, using appropriate resources strategically.	We're not sure. The Major Field Test will provide some information about this. We may need to get instructor ratings based on student performance in class.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Results and brief explanation/discussion
3. Learn mathematics independently by locating and assimilating technical material.	1. Textbook assignments completed independently in MATH 395 (rated on common rubric). 2. Final project presentations in MATH 395 (rated by peers and instructor on common rubric)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Results and brief explanation/discussion
4. Communicate mathematical ideas using proper terms and symbols.	1. Proofs written in WI-MATH 220 and WI-MATH 380. 2. Instructor ratings from MATH 300 (based on written assignments and exams)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Results and brief explanation/discussion
5. Write concise and rigorous mathematical proofs	1. Proofs written in WI-MATH 220 2. Proofs written in WI-MATH 380	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Results and brief explanation/discussion
6. Appreciate the career and educational opportunities for mathematics majors	1. Faculty ratings based on advising meetings 2. We may be able to get information from the University Alumni Survey.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Results and brief explanation/discussion
7. Critically consume and apply research and local/state/national standards in mathematics education to plan, deliver, and evaluate effective instruction.	1. Instructor and peer ratings of simulated teaching experiences in MATH 340 (rated on common rubric). 2. Research review papers written in MATH 340 (rated on common rubric). 3. Student and instructor evaluations of performance in MATH 399.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Results and brief explanation/discussion

3. Evaluation of contributions to General Education Outcomes:

General Education SLOs	Course(s) contributing to SLO	When will you review course? 11-12 12-13 13-14 14-15 15-16	How are the courses designed to help students attain the outcome?	What do students do to demonstrate achievement towards the outcome?
8. Use quantitative information to solve problems	QUANT 113 QUANT 131 MATH 152 MATH 171 MATH 210	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	These classes were all designed around mathematical or quantitative modeling and problem solving. Instructors introduce algebraic, trigonometric, or probabilistic concepts, model problem solving methods, and then ask students to apply those methods to novel problems on assignments and exams. We will review course syllabi during the years indicated.	Exams in all these courses assess the ability of students to solve quantitative problems. Projects in QUANT 113 and 131 also assess problem solving ability. We will review course exams and assignments during the years indicated.
16. Evaluate the validity of arguments, sources, analysis methods and conclusions	QUANT 113 QUANT 131 MATH 171	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	In each of these courses, students are asked to select the best (most appropriate or efficient) methods to solve problems. To do this, they must be able to evaluate the validity of the methods they have learned to the problems they intend to solve. In QUANT 113 and QUANT 131, students are asked to evaluate conclusions made from quantitative analyses. We will review course syllabi during the years indicated.	Exams in all these courses include items that require students to evaluate the validity of analysis methods. Projects in QUANT 113 and 131 require students to evaluate conclusions. We will review course exams and assignments during the years indicated.