- Academic Report due to Dean or VP by April 1 for initial approval.*
- Report due to Prioritization Committee no later than April 15th.
- Information to help complete this report may be found on the Institutional Prioritization Blackboard site.

St. Ambrose University Program Prioritization Study

Template for: Academic Programs

Review for: FY 2010, 2011, and 2012

(AKA academic years 2009-2010, 2010-2011, and 2011-2012)

Program: Any activity or collection of activities that consumes resources: dollars, people, space, equipment, or time.

Program Information

Program Name(s): Mathematics major (B.S. in Mathematics)
Mathematics – Teaching, major (B.S. in Secondary Mathematics Education)
Mathematics, minor
Mathematics – Teaching, minor (Secondary Teacher's Certificate with a Minor in Mathematics)
Mathematics (5-12), endorsement
Mathematics (K-8), endorsement
(We also discuss our developmental math and General Education programs separately, when appropriate)

College: Arts & Sciences

Individual responsible for this report: Brad Thiessen

Names of individuals involved in creating this report: Brad Thiessen, Tom Anderson

PROGRAM EXPLANATION (CRITERIA 1)

Program should be explained in no more than 2-3 paragraphs and address the following questions.

Possible resources: departmental and university history, mission, vision, values

- Why was program(s) established?
- Has the purpose of the program(s) evolved over the years?
- To what extent has the design of the program(s) adapted to meet change (enrollment, delivery format, discipline or pedagogical shifts)?
- In what way(s) does the program(s) contribute to St Ambrose University's achievement of its mission, vision, and values?

Mathematics-related programs may have been established due to the fact that math is a key component of the liberal arts. Since most of our faculty have worked at St. Ambrose for less than 10 years, we will comment on the evolution of our programs over the past decade. The tables on the following pages summarize how our department has evolved from offering programs focused on traditional methods of teaching mathematics majors to offering programs focused on research-based pedagogy to develop the quantitative skills of all SAU students.

	2003-2004	2012-2013	Comments
Mission	To assist in the University mission, 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 math and to prepare them for graduate school or for careers in mathematics, mathematics teaching, or related fields.	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.	Our departmental mission has expanded from developing the conceptual skills of our majors to developing the quantitative skills of all SAU students. The evolution of our mission mirrors how we view our department. Instead of being responsible only for our majors, we see ourselves as stewards of the quantitative skills of all SAU graduates.
Departmental Goals	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	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 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 3. To assist students in seeking employment or further study 4. To provide ongoing mentoring and in-service opportunities to practice mathematics teachers	Our departmental goals also demonstrate the shift in our focus from math majors to all SAU students.

	2003-2004	2012-2013	Comments
Degrees and programs offered	B.S. in Mathematics B.S. in Secondary Mathematics Education Minor in Mathematics Secondary Teacher's Cert. w/Math Minor Service to elementary math endorsement (MATH 210) Service to engineering (MATH 280, 300, 301) General Education math courses Developmental math (MATH 090, 095)	B.S. in Mathematics B.S. in Secondary Mathematics Education Minor in Mathematics Secondary Teacher's Certificate with a Math Minor Service to elementary math endorsement (MATH 210, 211) Service to engineering (MATH 290, 291, 300, 320) General Education quantitative courses Developmental math (MATH 099)	In the last decade, the Mathematics Department has not added or eliminated any academic programs. We have worked to better serve other departments by adding courses (MATH 211 for the elementary math endorsement) and modifying courses (MATH 290, 300, and 320 for engineering majors). We have also worked to streamline our developmental and General Education course offerings. We are not aware of any student ever completing the Secondary Teacher's Certificate with a Minor in Mathematics.
Student learning outcomes	After completing the courses required for a major in mathematics at St. Ambrose, 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.	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.	Our student learning outcomes have matured over the past decade, focusing more on skill development than content attainment. This aligns with the evolving recommendations of the Mathematical Association of America (MAA), the American Mathematical Society (AMS), the National Council on Teachers in Mathematics (NCTM), and the American Statistical Association (Amstat).

	2003-2004	2012-2013	Comments
Courses offered	MATH 090: Fundamentals of Mathematics MATH 091: Fundamentals of Math Workshop MATH 095: Intermediate Algebra MATH 096: Intermediate Algebra Workshop MATH 101: Orientation to College Math MATH 131: Math for the Liberal Arts MATH 151: College Algebra MATH 152: Trigonometry MATH 161: Math for Business and Economics MATH 171: Precalculus MATH 191: Calculus & Analytic Geometry I MATH 192: Calculus & Analytic Geometry II MATH 210: Theory of Arithmetic MATH 220: Introduction to Logic & Proof MATH 230: Topics in Mathematics MATH 280: Engineering Math MATH 290: Elementary Linear Algebra MATH 291: Calculus III MATH 300: Probability & Statistics I MATH 301: Probability & Statistics II MATH 305: Data Analysis MATH 320: 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 MATH 380: Abstract Algebra I MATH 381: Abstract Algebra II MATH 395: Seminar in Mathematics MATH 396: Seminar in Mathematics MATH 400: Topics in Mathematics MATH 490: Independent Study in Mathematics	MATH 099: Developmental Math (online) QUANT 131: Thinking Mathematically MATH 171: Elementary Functions MATH 191: Calculus & Analytic Geometry I MATH 192: Calculus & Analytic Geometry II MATH 210: Theory of Arithmetic MATH 211: Math Concepts for Teachers MATH 220: Introduction to Logic & Proof 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 380: Abstract Algebra I MATH 395: Undergraduate Seminar in Math MATH 399: Postsecondary Teaching Exp. MATH 400: Topics in Mathematics	We have worked to better align our course offerings with the needs of our majors, the needs of majors in the STEM disciplines, and our revised General Education program. From 1993-2003, the number of courses we offered increased from 28 to 33. Since 2003, we have reduced our course offerings from 33 to 21. We did not eliminate these courses out of pressure to reduce costs; we eliminated these courses to align with best practices, to improve student learning, and to best utilize our limited resources to serve an increasing number of students. Assessment results clearly showed our developmental and General Education math courses were not effective in preparing students with the skills they need for their majors. Because of this, we increased the university math placement standards and replaced 5 remedial courses (MATH 090-101) with a single online developmental math course (MATH 099). Likewise, we replaced 4 General Education math courses (MATH 131-171) with a quantitative reasoning course (QUANT 131) and a mathematical modeling course (MATH 171). We've only implemented these changes for a single semester, but assessment results indicate these changes are having a dramatic effect on the mathematical and quantitative skills of our students. To more accurately advertise the degree program we can offer, we eliminated upper-level elective courses that we have not been able to offer consistently. We also worked with the engineering department to eliminate MATH 280 and redesign our courses to better serve the needs of their students.

While we cannot provide much detail about the long history of our program, our mission statement tells us the reason why our program currently exists: To contribute to the mission of St. Ambrose by developing the intellectual skills of our students in a key area of the liberal arts.

In developing an online developmental mathematics program, streamlining our General Education course offerings, and modifying the content and pedagogy of our courses, our program has adapted to provide more effective learning experiences for an increasing number of students; maximizing the skills and expertise of our faculty. These improvements demonstrate how we contribute to the vision of St. Ambrose to be recognized as a leading Midwestern university committed to academic excellence.

INTERNAL AND EXTERNAL DEMAND FOR THE PROGRAM AND SIZE AND SCOPE OF THE PROGRAM (CRITERIA 2)

Program should attempt to address all questions. Include quantifiable answers as much as possible.

Possible resources: Induced course matrix, IR data – Stat Pak, US and regional Labor supply and demand statistics, Noel-Levitz program demand study results, departmental data, induced course matrix

For the past 3 years:

- Identify student enrollment in the program(s) as able

Program Name	Enrollment 2009-2010	Enrollment 2010-2011	Enrollment 2011-2012
B.S. in Mathematics	8	3	4
B.S. in Secondary Math Education	17	26	29
Minor in Mathematics			30-40*
Secondary Teacher's Certificate with a Minor in Mathematics	0	0	0
Mathematics (K-8) endorsement (These students take 8+ math courses)	(we estimate ~5 students)	(we estimate ~5 students)	(we estimate ~8 students)
Service to engineering students (These students take 6+ math courses)	64	61	58
General Education quantitative courses			(approximately 350-400)
Developmental Mathematics			(approximately 60)

Sources: 2012 StatPak (pp. 77-78)
Beeline (for GenEd and Developmental enrollment)

* Beginning in 2011-12, all students earning degrees in engineering also complete requirements for the Minor in Mathematics

- Identify the degrees and/or certificated conferred by the program(s)

Degrees and/or Certificates	Graduates 2009-2010	Graduates 2010-2011	Graduates 2011-2012
B.S. in Mathematics	4	0	1
B.S. in Secondary Math Education	4	3	5
Minor in Mathematics	4	5	7
Secondary Teacher's Certificate with a Minor in Mathematics	0	0	0

Source: 2012 StatPak (p.83)

- Credit hours generated by the program(s). Create a separate table for each program if your report includes more than 1 program. Be sure to label the tables with the appropriate program name.

Math Department Courses	Total Credit Hours Generated	Total Credit Hours Generated by B.S. in Math Majors	Total Credit Hours Generated by Secondary Math Education Majors	Total Credit Hours Generated by Engineering Majors	Total Credit Hours Generated by Other STEM Majors	Total Credit Hours Generated by Non-STEM Majors
2009-2010	1737	52	153	261	176	1095
2010-2011	1808	45	176	192	179	1216
2011-2012	1833	54	190	239	234	1116

During 2011-12, Math Majors generated 3% of the student credit hours within the Math Department. Math Education majors generated 10% of our SCH. 39% of our SCH were generated by STEM majors and 61% were generated by non-majors.

In 2011-12, Math and Math Education majors generated 878 credit hours across the institution.

- Practicum, clinical, field hours, and/or internships supervised for 2011-2012. May include additional years. Create a separate table for each program if your report includes more than 1 program. Be sure to label the tables with the appropriate program name.

Program: B.S. in Secondary Mathematics Education			
Practicum, clinical, field hours, and/or internships	**Brief description of geographical location**	**Hours required by student**	**Type, duration, and frequency of supervision by SAU Employees**
Faculty in our department supervised 4 student teachers in EDUC 419: Student Teaching during 2011-12	Local school districts	15 weeks	Each supervisor observes each student teacher at least 10 times throughout the semester.
We supervise students in our MATH 399: Postsecondary Clinical Teaching Experience course as they complete clinical hours for our developmental math course	SAU main campus	45 hours	The course instructor supervises each student 1 hour each week for 15 weeks.

- What service and/or resources does this program(s) currently provide to other academic programs, and to what degree?

  We serve virtually all SAU students through our Developmental and General Education courses. We serve the engineering programs by offering 6 courses, many of the STEM disciplines by offering Calculus courses, and the elementary education math endorsement by offering 8 required courses.

- What service and/or resources does this program(s) currently need from other academic programs, and to what degree?

  Other than the General Education courses offered by departments within the College of Arts & Sciences, our B.S. in Mathematics only requires a single course in computer programming from the Department of Computer and Information Sciences. Our B.S. in Secondary Mathematics Education requires a significant amount of coursework from the Teacher Education Program. Secondary Mathematics majors also are assigned advisors from the Teacher Education Program.

- What is the impact on other academic programs, if this program(s) is altered or eliminated?

  Since the B.S. in Mathematics and the B.S. in Secondary Mathematics Education share so many courses in common, altering/eliminating one program will significantly impact the other.

  Eliminating the B.S. in Mathematic would allow us to eliminate 2 courses (MATH 305, MATH 400) without affecting any other programs. All other courses would still need to be offered for General Education, STEM, or Math Education majors. Since we offer, at most, a single section of MATH 305 or 400 each year, the cost savings would be negligible. Eliminating this program would, possibly, cost the institution 1-3 students per year.

  Eliminating the B.S. in Secondary Mathematics Education would allow us to eliminate 3 courses (MATH 340, MATH 360, MATH 399) without affecting any other programs. We offer MATH 340 and 360 once each year and MATH 399 each semester, so eliminating the B.S. in Secondary Mathematics Education could allow us to cut 12 credits annually. If we did this, however, the institution would lose approximately 5 students per year and enrollment in teacher education courses would decline accordingly.

  Eliminating both our majors would allow us to eliminate 10 courses (approximately 24 credits each year) without affecting other academic programs. The elimination of these majors would cost the institution 5-10 students per year and would reduce enrollment in computer science programming and General Education courses. Eliminating both majors would also reduce enrollment in math courses required for industrial and mechanical engineering, possibly making it more difficult to justify offering those courses each semester.

  Eliminating the minor in mathematics would impact engineering majors who earn the minor by completing their major requirements. Since very few other students have minored in mathematics, eliminating this program would have no noticeable impact on other academic programs.

  If we were to eliminate our Developmental Math program (MATH 099), it would mean approximately 100-150 freshmen each year would need to take a developmental math course at another institution (possibly at a community college or online university). We currently use the ALEKS system for our online MATH 099 course (a 3-credit-hour course that does not count towards the 120-hour graduation requirement). ALEKS offers a virtually identical online (ACE-credit-recommended) course to students for approximately $90. While enrolling in MATH 099 gives students access to on-campus resources (the Student Success Center and an instructor), we could eliminate the course and require students to complete the $90 ALEKS course. Eliminating MATH 099 would not impact other academic programs and may not have any impact on student achievement.

  Eliminating our General Education program (QUANT 131 and MATH 171) would impact almost all other academic programs. Eliminating QUANT 131 would mean students majoring in the humanities programs would need to take another course to fulfill the General Education quantitative problem-solving outcome. Since QUANT 131 is the only General Education quantitative course without a prerequisite, eliminating it would mean some (possibly many) humanities majors would need to take a developmental math course before taking another course to fulfill General Education requirements. Eliminating MATH 171 would mean all social science and natural science majors would need to take another General Education quantitative course.

  The impact of altering our programs depends, obviously, on the nature of the alteration. Over the past two years, we consulted with virtually every other academic program on campus as we redesigned and implemented major changes to our developmental and General Education programs. From

that process, we learned that any change to those programs significantly impacts many programs on campus. Changes to our major and minor programs impact engineering and other STEM programs.

To demonstrate the interdependence of our programs (and how any changes to one of our programs could impact others), the following table displays the course requirements for mathematics-related programs on campus:

	Developmental Mathematics	General Education	STEM Majors	Math Minor	B.S. Math	B.S. 2ndary Math Educ.	Elementary Math Endorse.	Engineering Majors
MATH 099	X							
QUANT 131		X						
MATH 171		X	X					
MATH 191		X	X	X	X	X	X	X
MATH 192			X	X	X	X	X	X
MATH 210		X					X	
MATH 211							X	
MATH 220					X	X		
MATH 290				X	X	X		X
MATH 291				X	X			X
MATH/STAT 300				X	X	X	X	X
MATH/STAT 301					Elec.	X	X	
MATH/STAT 305					Elec.			
MATH 320				X	X			X
MATH 340						X		
MATH 360						X		
MATH 370					X	X		
MATH 380					X	X		
MATH 395					X	X	X	
MATH 399						X		
MATH 400					Elec.			

As the table shows, we've worked to streamline our course offerings so that nearly all of our courses are required by multiple programs. This has increased enrollment in our courses and decreased our reliance on adjuncts and overloads.

- What are current internal trends that might affect any interrelationships among this/these and other programs?

  One institutional trend that is impacting our programs is the movement many programs have made to eliminate mathematics requirements or to offer courses that are traditionally offered within a Mathematics Department. The Computer Information Sciences Department, for example, offers a Discrete Structures course that is typically offered as *Discrete Mathematics* at other institutions. CIS is also proposing to eliminate Calculus as a requirement for the major. The College of Business, as another example, has proposed a *Quantitative Reasoning for Business* course that COB majors will take to fulfill General Education quantitative problem solving requirements. Statistics courses typically offered in Mathematics Departments, such as STAT 213, STBE 237, and CRJU 430, are housed in other departments and the engineering programs proposed to offer their own engineering statistics course. While we disagree with all of these proposals and decisions, we understand the motivations behind them.

  Another trend that has recently become apparent is that students are opting to take (and, in many cases, being advised to take) mathematics courses at community colleges and online universities. These courses, which are less costly (and, possibly, rigorous) than our courses, are pulling students away from our General Education and major-level courses. Based on our departmental assessment data, our majors who take online courses from other universities (University of Phoenix and LSU) are not prepared for subsequent courses taken on campus. Likewise, we have found that students who earn credit for Advanced Placement courses in high school (for Calculus or Statistics) are not prepared at the same level as students who take our courses on campus.

  Both these trends point to the commoditization of mathematics at St. Ambrose. Students have access to cheap (and, potentially, less demanding) courses that transfer in credits equivalent to our course offerings. Our institutional practice to accept these transfer credits leads our students, advisors, and faculty to perceive no difference in value between courses offered by our Department and courses offered by our competitors. Likewise, by making mathematics and quantitative problem solving courses equivalent (at least in terms of fulfilling General Education requirements), we imply that mathematics has no value beyond its application to specific disciplines. If these trends continue (without a significant change in institutional practice or the courses offered by our Department, we will continue to see depressed enrollment in our MATH 099, 171, 191, 192, 290, and 291 courses.

- Explain how current programs) enrollment compares to regional external demand indicators?

  A 2011 study conducted by the Center on Education and the Workforce at Georgetown University entitled, *The Economic Value of College Majors*, collected data on 171 different undergraduate major programs. The study found that while mathematics majors earn relatively high salaries (with a median salary of $67,000 for a B.S. in Mathematics), the math major remains unpopular (with just over 1% of U.S. undergraduates earning the degree).

  While our enrollment also points to math as being an unpopular choice of major, the *2010-2020 State of Iowa Occupational Projections* report (from Blackboard) predicts a 2-3% annual growth rate in mathematical occupations. Perhaps this growth, along with strong salaries for mathematics majors, could increase local demand for mathematics programs.

  One potential area for growth for our department is in statistics and/or actuarial science. Statistics-related majors, also with a median salary of $67,000, are growing in popularity. According to the 2011 Georgetown study, the percentage of undergraduate students graduating with a degree in statistics is

now virtually the same as the percentage graduating with mathematics degrees. This increased interest and demand for statistics programs is also evidenced by:

- increasing enrollment in AP Statistics courses (up 73% in 5 years)
- increasing enrollment in undergraduate introductory statistics courses (up 50% in 5 years)
- increasing enrollment in upper-level statistics courses (up 69% in 10 years)
- increasing enrollment in our STAT 213, STBE 337, MATH 300, and MATH 301 courses

As we'll describe in the last section of this report, we believe we could add a statistics major at St. Ambrose that would complement our existing programs at a minimal cost.

Local demand for our Secondary Mathematics Education major has been relatively steady over the past decade. Our majors are all hired quickly after graduation and we expect that to continue. A recent report from the Iowa Department of Education entitled, *Teacher Shortages in Iowa*, ranks secondary mathematics teachers as one of the top 3 shortage areas (where it has been for the past 9 years). The report indicates that while 214 secondary math teachers are ready to retire, only 120 are projected to graduate.

Sources:
The Economic Value of College Majors: http://magazine.amstat.org/blog/2012/11/01/elementarystats/
Elementary-level Statistics Enrollments Increase: http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/whatsitworth-complete.pdf
The Rise of the Undergraduate Program in Statistics: http://magazine.amstat.org/blog/2012/08/01/prescornerundergradstats/
More than 1 Million and Counting: The Growth of AP Statistics: *http://magazine.amstat.org/blog/2012/09/01/prescolumnsept2012/*
Teacher Shortages in Iowa: *http://educateiowa.gov/index.php?option=com_docman&task=doc_download&gid=6407*

INVENTORY OF INPUTS, PROCESSES, AND OUTCOMES OF THE PROGRAM (CRITERIA 3)

Much of this information will be reported in a chart format for ease of reporting and consistency in evaluating

Possible resources: Departmental reports, EPC 5-year Reviews, specialized accreditation reports, Delaware Study results, Annual Assessment reports/results

- Faculty and staff qualifications, awards, grants, publications, conference presentations for 2011-2012. Note any new faculty or staff for current year if appropriate, as well as the program(s) all faculty and staff are aligned with.

Faculty and staff member(s)	Position	Degree qualifications, certificates, training, etc	Awards, honors, grants, publications, conference presentations
Thomas Anderson	Professor	Ph.D. in Mathematics	
Ilwoo Cho	Associate Professor	Ph.D. in Mathematics	
Tim Gillespie	Visiting Assistant Professor	Ph.D. in Mathematics	
Kathy Potter	Non-tenure track Assistant Professor	B.S. in Mathematics, M.S. Ed	
Brad Thiessen	Chair; Associate Professor	Ph.D. in Measurement & Statistics PStat® Accredited Professional Statistician	• Presented at the 2011 USCOTS e-Conference (U.S. Conference on Teaching Statistics) (5/2011) • Advisor for NSF-TUES grant program: *Developing an Innovative Randomization-Based Introductory Statistics Curriculum* (5/2011-present) • Presented at the 2012 Joint Statistical Meetings in San Diego (8/2012)

Note that we do not have any faculty who specialize in secondary mathematics education (our most popular major within the department).

- % of instruction offered by fulltime faculty versus adjunct or part-time faculty for the program(s) (insert results from Delaware Study or from analysis of Beeline course offerings). Include the past three years, and report in a table format.

The following table summarizes our Delaware Study data. Roughly speaking, the lower-division data represents our General Education course offerings and upper-division data represents course offerings for STEM majors.

	2009-10	2010-11	2011-12
% lower division SCH	Tenure-track faculty: 41% Other regular faculty: 24% Part-time faculty: 34%	Tenure-track faculty: 22% Other regular faculty: 33% Part-time faculty: 45%	

% upper division SCH	Tenure-track faculty: 19% Other regular faculty: 80% Part-time faculty: 2%	Tenure-track faculty: 99% Other regular faculty: 0% Part-time faculty: 1%	
% total SCH	Tenure-track faculty: 39% Other regular faculty: 30% Part-time faculty: 31%	Tenure-track faculty: 30% Other regular faculty: 29% Part-time faculty: 40%	
% lower division sections	Tenure-track faculty: 43% Other regular faculty: 22% Part-time faculty: 35%	Tenure-track faculty: 23% Other regular faculty: 36% Part-time faculty: 41%	
% upper division sections	Tenure-track faculty: 43% Other regular faculty: 43% Part-time faculty: 14%	Tenure-track faculty: 80% Other regular faculty: 0% Part-time faculty: 20%	
% total sections	Tenure-track faculty: 43% Other regular faculty: 27% Part-time faculty: 30%	Tenure-track faculty: 33% Other regular faculty: 30% Part-time faculty: 37%	

Note: In Fall 2012, we significantly increased our reliance on adjuncts. Adjunct faculty taught 6 sections (approximately 20% of our course offerings and 25% of our student credit hours) in Fall 2012.

- List of courses within the program(s) that typically (more than twice) have enrolled five or fewer students within the past 3 years. Explain the reasoning behind these offerings. Create a separate table for each program if your report includes more than 1 program. Be sure to label the tables with the appropriate program name.

Course Title	Dates Offered	Enrollment	Rationale for Offering
MATH 395/396	Each semester	1-4 students	These were offered as unpaid independent study sections. We've eliminated MATH 396 and made MATH 395 a requirement for our B.S. in Mathematics, B.S. in Secondary Math Education, and Elementary Endorsements majors. We expect enrollment in this capstone course to increase.
MATH 360	Fall 2009 Fall 2010 Spring 2012	3-5 students	We had some advising issues that led to a small number of elementary math endorsement students needing this course. This course is no longer required for the elementary math endorsement, so enrollment will decline. We are actively investigating how best to manage the "modern geometry" state requirement for the secondary math major.
MATH 400	Fall 2009, Spring 2010 Fall 2011, Spring 2012	2-4 students	We offered this topics course to math majors who were interested in preparing for graduate school or employment.

We continue to offer too many unpaid independent studies to students who need to fulfill graduation requirements. This semester, we are teaching two unpaid independent studies (MATH 396, MATH 400).

- Equipment, technology, and specialized space – only complete this section for those items that are not currently adequate in the program(s). Create a separate table for each program if your report includes more than 1 program. Be sure to label the tables with the appropriate program name.

All Programs				
Equipment, Technology, and Specialized Space	**Purpose of Equipment, Technology, and Space**	**Frequency of Use**	**Estimated Annual Cost (include maintenance)**	**Required Training Necessary for Use of Equipment, Technology, or Space**
Statistical applications in computer labs. We need a license for Stata (relatively low-cost) or we could install R (free) on all campus lab computers.	Students need to learn how to use modern statistical applications for data analysis. SPSS serves social science majors, but does not serve majors in natural and mathematical sciences.	Throughout each semester in MATH 300, 301, and 305.	R is a free, open-source application. Annual maintenance (upgrades) would cost IT something (to install and test the upgrades) A 15-computer license for Stata would cost $1575 annually. This would be adequate for our department, since students would collaborate on analyses.	None

- Non-academic program use unique to the academic program(s) (e.g. if non-academic program significantly changes, so will academic program or vice versa). Describe this relationship and rationale.

  Students in our General Education classes are, probably, heavy users of the peer tutoring offered by the Student Success Center. Our developmental math program reserves computer labs on campus.

- Samples of exemplary performance awards for program(s) and/or students (insert relevant evidence).

  Over the last 15 years, two of our students have gone on to earn Ph.Ds and another 3 are currently in Ph.D. programs. At least 6 of our Math Education majors over the past 10 years have gone on to earn Master's Degrees.

- Student scores on national tests, state boards, etc (insert relevant evidence for up to past 3 years) for the program(s).

  We will discuss results from the Major Field Test in the next section.

- Measures of student learning outcomes and their results with intended outcomes for the program(s). Create a separate table for each program if your report includes more than 1 program. Be sure to label the tables with the appropriate program name.

Student Learning Outcome for Program	Most Current Measured Outcome Result	Analysis of Results/Findings/Conclusions
1. Demonstrate a breadth and depth of knowledge appropriate for a bachelor's degree in mathematics	Sources: Results from Major Field Test in Mathematics	The Major Field Test was piloted to majors in mathematics and math education in May. Our goal was for senior math and math education majors to score above the median (a score of 155). Our capstone course, in which they will take this exam, becomes a requirement for new majors beginning next year, so we could only pilot the exam to available students in our MATH 360 course. Results: Score Percentile Major Math courses left to complete ------- ---------- ---------- ---------- 158 55 MathEd 2 - met 155 49 MathEd 2 - within CI 152 42 MathEd 2 - within CI 149 34 Math 0* - within CI 149 34 MathEd 0* - within CI 137 11 MathEd 4 134 7 MathEd 3 131 4 MathEd 3 123 1 MathEd 5 * = student who has completed all required math courses Discussion: At first glance, only 1-5 students met our expectations. This included one student who has yet to complete two required courses in the major. The two students in this group who have completed all required math courses both scored at the 34th percentile. Looking at their program evaluations, we notice one of these students took 3 upper-level math classes taught by a one-year visiting instructor. We will investigate this student's sub-scores to determine if the student performed poorly in the content covered in those courses. To determine relative strengths and weaknesses of the tested group, we could examine subscores. Since this was only a pilot of this test, we decided not to pay for the subscore report. This test had a relatively large standard error of measurement (anywhere from 8.4-8.8, depending on the student). Thus, a 95% confidence interval around the median would be a score anywhere from 138-172. Using this standard, 5 out of 9 students met our expectations. Students who have yet to complete 3+ math classes scored below this standard. This provides some evidence validating the use of this test to assess our curriculum. These scores were lower than we expected (and significantly lower than what we would want to see). We believe the curricular revisions that go into effect next year will improve student performance on this exam. For one, our curricular revisions more closely align course requirements for our math and math education majors. This will ensure math education majors take courses that will better prepare them for this Major Field Test. Second, we will

		have a capstone course in which our seniors will take this exam (rather than the juniors who took the exam this year). Third, we replaced elective courses within each major program with additional required courses. These required courses will better equip our majors with core content and skills. While examining these scores, faculty within our department made a few conclusions: 1. Our students do not possess adequate mathematical knowledge. This, possibly in large part, can be explained by the fact that we tested juniors rather than seniors. We are worried that we may graduate math education majors who do not understand, appreciate, or even like mathematics. We need to develop a process by which we can continuously monitor the performance of our math education majors as they progress through the program. 2. We teach too much stuff. Our courses have mirrored math textbooks - they get bigger over time, sacrificing depth for breadth. We need to focus on core concepts, reinforce those concepts over time, and hold our students accountable for learning those core concepts. To do this, we may need to cover less in our courses. We will examine our course content, evaluate whether we would better be served by 4-credit courses with more depth, and see if we can better design our curriculum to promote a core understanding. 3. The students who transferred in credits equivalent to our Calculus courses scored lower than students who completed all math courses at SAU. 4. We need time to better examine the content tested by the Major Field Test and ensure it aligns with our curriculum. This year, we began collecting course exams. Because our courses and major requirements are changing (beginning Fall 2012), we didn't feel it was a good use of our time to analyze these exams. At this point, we're satisfied that we've developed a process we can use in the future.
2. Persevere in modeling and solving routine, non-routine, and applied problems, using appropriate resources strategically	This outcome is new as of 2011-12. We plan to assess this outcome within the next 4 years.	
3. Demonstrate the ability to learn mathematics independently by locating and assimilating technical material	Sources: 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	We had an unusual group of students in MATH 395 this year. Rather than having all math and math education majors (as will be required beginning next year), we had three elementary math education majors who took the course to fulfill WI requirements. Only 2 students were mathematics majors. To deal with the varying level of mathematical understanding in the class, each student created their own individualized plan for the course. Each student also created their own rubric to clearly define how they would meet course expectations. The instructor then approved the plans and rubrics. Of the five students in the course, four fully met our expectations for independent learning. They were able to locate physical and electronic resources to research a topic and collect/analyze data. One student did not meet our expectations, but was able to successfully complete the course with significant assistance from the instructor.

<table>
<tr><td></td><td>rubric)</td><td>All five students met our expectations (as defined by their self-developed rubrics) on the project presentations. Beginning next year, we will collect and maintain student projects in this course.</td></tr>
<tr><td>4. Communicate math ideas using proper terms and symbols</td><td>This outcome is new. We will assess this outcome within the next 4 years.</td><td></td></tr>
<tr><td>5. Write concise and rigorous mathematical proofs</td><td>This outcome is new as of 2011-12. We plan to assess this outcome within the next 4 years.</td><td></td></tr>
<tr><td>6. Appreciate the career and educational opportunities for mathematics majors</td><td>This outcome is new as of 2011-12. We plan to assess this outcome within the next 4 years.</td><td></td></tr>
<tr><td>7. Critically consume and apply research and local/state/national standards in mathematics education to plan, deliver, and evaluate effective instruction</td><td>This outcome was assessed during Fall 2012.

Sources:
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.</td><td>We had 6 secondary math education majors in MATH 340: Secondary Math Methods this year and another 3 in MATH 399: Postsecondary Clinical Teaching Experience.

Simulated teaching experiences were evaluated using an “Implementing Standards for Mathematical Practice” rubric developed by the Institute for Mathematics and Education at the University of Arizona. The rubric rates 8 areas on a 4-point scale. Below, the total scores are displayed for simulated lessons taught by students each month this semester:

<table>
<tr><th>Student</th><th>September Lesson</th><th>October</th><th>November</th><th>December (32 points possible)</th></tr>
<tr><td>1</td><td>0</td><td>4</td><td>19</td><td>25</td></tr>
<tr><td>2</td><td>1</td><td>12</td><td>24</td><td>28</td></tr>
<tr><td>3</td><td>0</td><td>4</td><td>9</td><td>25</td></tr>
<tr><td>4</td><td>0</td><td>6</td><td>14</td><td>24</td></tr>
<tr><td>5</td><td>0</td><td>4</td><td>14</td><td>24</td></tr>
<tr><td>6</td><td>0</td><td>3</td><td>16</td><td>20</td></tr>
</table>

As the table shows, students improved tremendously over the course of the semester. By semester’s end, students were performing relatively well in designing structured tasks that require perseverance, quantitative reasoning, and pattern recognition. Students still had difficulties giving precise instructions & incorporating multiple learning tools.

Students in MATH 340 also wrote two research papers – one on a controversial topic in mathematics education and another reviewing research in math education. As a class, we designed a rubric to evaluate the research papers. Students were then given opportunities to rewrite their papers in order to meet the expectations set in the rubric. By the end of the semester, these research reports provided evidence that our majors can, in fact, critically consume research in math education.</td></tr>
</table>

REVENUE/RESOURCES AND COSTS/EXPENSES ASSOCIATED WITH THE PROGRAM (CRITERION 4)

Much of this information will be reported in a chart format for ease of reporting and consistency in evaluating

Possible resources: Cost and revenue report , departmental expense reports

- Direct revenue of the program or department (from spreadsheet on Blackboard) for this program(s). Create a separate table for each program if your report includes more than 1 program. Be sure to label the tables with the appropriate program.

Program	FY 2010 (2009-2010)	FY 2011 (2010-2011)	FY 2012 (2011-2012)
Math Department	$991,852	$1,053,966	$1,078,137

- Grants, Gifts, and Endowments received (include research, scholarship, equipment, etc) for the program(s). Create a separate table for each program if your report includes more than 1 program. Be sure to label the tables with the appropriate program name.

Grant, Gift, or Endowment Name	Brief Description of Fund Use	Amount of Funds
Total Grant or Endowed Funds		N/A

- Direct cost of the program(s) or department (from spreadsheet on Blackboard) for this program(s).

Program	FY 2010 (2009-2010)	FY 2011 (2010-2011)	FY 2012 (2011-2012)
Math Department	$457,981	$472,957	$441,008

- Net income or loss of the program(s) or department (from spreadsheet on Blackboard) for this program(s).

Program	FY 2010 (2009-2010)	FY 2011 (2010-2011)	FY 2012 (2011-2012)
Math Department	$73,710	$69,785	$113,858

- Amount of reassigned time (credit hours) devoted to program(s) needs (e.g. dept. chair, program coordinator, etc.) for 2011-2012. Note any exceptions for the year. Create a separate table for each program if your report includes more than 1 program. Be sure to label the tables with the appropriate program name.

Personnel	Amount of reassigned time	When reassigned time is utilized (Fall, Spring, Summer, etc)	Program purpose served with reassigned time
Brad Thiessen	25%	All year	Chair of Mathematics Department
Brad Thiessen	25%	All year	University Assessment Coordinator

- Number of overload course assignments used to deliver the program(s) for 2011-2012. Note any exceptions for the year. Create a separate table for each program if your report includes more than 1 program. Be sure to label the tables with the appropriate program name.

Course	Credit hours	When overload is utilized (Fall, Spring, Summer, etc)	Rationale for overload
MATH 191: Calculus I	1 overload lab credit	2 credits in Fall, 1 credit in Spring	Required lab component
MATH 192: Calculus II	1 overload lab credit	1 credit in Fall, 2 credits in Spring	Required lab component
MATH 291: Calculus III	1 overload lab credit	Spring	Required lab component
MATH 360: Modern Geometry	3 credits	Fall	Poor advising led to students needing this course for graduation
MATH 340: Secondary Methods	3 credits	Spring	Students needed the course for graduation

- Amount of stipends used for non-teaching service for the program(s) for 2011-2012. Note any exceptions for the year. Create a separate table for each program if your report includes more than 1 program. Be sure to label the tables with the appropriate program name.

Personnel	Amount of stipend	When stipend is utilized (Fall, Spring, Summer, etc)	Program purpose served with stipend
N/A			

REALLOCATION ANALYSIS (CRITERIA 5)

Program should answer question in no more than 3-4 paragraphs.

Possible resources: departmental or program discussion, meetings, plans, proposals, etc.

- What ideas does the program(s) have to seize opportunities for improvement or strengthening of the program using existing resources?

One idea we had (and proposed to EPC this Fall) was to rename our department to the "Department of Mathematics and Statistics" and to begin focusing on applied mathematics, statistics, and actuarial science. Over the past 3 years, about a dozen potential students have called or visited with an interest in statistics or actuarial science. This proposal could have helped us attract new majors and could have better served our existing majors (two of whom have recently been hired in actuarial science departments). Unfortunately, EPC did not vote on this proposal.

With careful planning, we could still rename our department, and possibly even add a major or minor in statistics, using our existing resources. More details of this proposal are provided in the "recommendations for reallocation" section of this report.

Another opportunity, that wouldn't require additional resources from our department but would require institutional resources, is to implement an adaptive, multi-stage placement system (such as the one offered by ALEKS at the regents universities in Iowa). By giving incoming freshmen an initial placement test, a period of time to remediate any deficient skills via an online learning system, and a final placement test, we will have the opportunity to more accurately place students in the appropriate math course. This would also give motivated incoming freshmen the opportunity to fulfill our developmental and General Education requirements without taking a single course at SAU. This proposal, which could increase student achievement, save students money, and reduce our staffing needs is detailed in the "recommendations for reallocation" section of this report.

Another idea we have to strengthen our Developmental and General Education programs with existing resources would be to offer ALEKS-based online versions of our MATH 099 and MATH 171 courses during the summer and winter terms. These online courses, which already exist and are offered by other universities, provide students a low-cost option to fulfill institutional mathematics requirements. They require very little administrative support, no instructional support, and give us the opportunity to gain some revenue by charging students a (reasonable) course fee. We will see more and more students fulfilling their math requirements this way, as more universities offer these low-cost online courses. It's a good idea for us to get out towards the front of this trend so we can ensure our students take a course where we have control over the academic standards.

Our MATH 360: Modern Geometry course, required only for our Secondary Math Education majors, should be redesigned. If we can develop a course that is appropriate for both Math Education and Math majors, it will strengthen both programs and could reduce our reliance on overloads/adjuncts. Likewise, we need to look into redesigning our MATH 340: Secondary Math Methods and MATH 399: Postsecondary Clinical Teaching Experience courses. In the next 3-5 years, staffing changes may force us to look at ways to modify or combine those courses to both strengthen our Secondary Math Education program and increase staffing efficiencies.

Yet another idea, that we would need to wait for our accreditors to catch-up to, would be to allow our majors to take advantage of existing online courses in order to fulfill their degree requirements. With more and more high-quality, upper-level, online math courses being offered (through EdX, Udacity, and Coursera), our program would definitely strengthen if we were able to award students by certifying what they learn from these courses. EdX, for example, offers free courses in mathematics and statistics from MIT, Harvard, Berkeley, and other universities. Our majors would benefit from

taking these online courses, but they would not get any official credit for doing so (the courses would not appear on their transcripts; the courses do not count towards degree requirements). If we could certify the learning that took place in these courses, we could have students take upper-level courses that are just too specialized to be offered at SAU.

- Explain how the program(s) would improve its serve to students with an addition of:
    a. up to 20% in personnel (to include FT, PT, student workers, GAs)
    b. up to 20% in non-personnel resources

An increase in our work study allocation (or the addition of a GA line) would give us the opportunity to hire a mathematics major to assist in tutoring students in upper-level courses or preparing research with faculty. A work study student would also give us an opportunity to develop a more formal assessment system to maintain our assessment data.

A 20% increase in our part-time (adjunct) budget would relieve some of our deficit, but it would not have been enough to cover the cost of adjuncts and overloads we incurred this Fall semester alone (or the projected costs for Fall 2013).

The most useful 20% increase in personnel would be the addition of a full-time line in our department. This full-time line would replace the position we lost 2 years ago (and were unable to fill in both 2010-11 and 2011-12), so this 20% increase in personnel would get us to the level we planned to have when we wrote our departmental goals as part of our 2011 program review.

A single full-time faculty member would allow us to do a combination of the following:

- Reduce our reliance on adjuncts and overloads

  While this is the least exciting benefit, an additional faculty member would allow us to improve our General Education program by increasing the quality of instruction (and better maintaining quality control) in our courses. This past Fall, we overspent our part-time budget line by about 40% in order to hire 5 adjunct faculty to teach 21 credits. We run the risk of having more adjunct faculty than full-time faculty, so the addition of a full-time line would ease some of the concerns we've had with adjuncts in the past. While adjunct instructors are able to teach our General Education courses, they have not proven able to attract students in these courses to our major programs. Managing so many adjunct instructors has proven to be difficult, as we've found many refuse to adhere to our course curricula and outcomes. A full-time line would also reduce our reliance on overloads and would give our existing faculty more opportunities to engage in research and service activities.
- Increase opportunities for our majors and increase student achievement

  A full-time faculty line would give us a greater capacity to engage in undergraduate research opportunities with our students. Currently, we're only able to offer our workshop and topics courses as independent studies (either unpaid or as overloads). An additional faculty member would give us the chance to focus more on student research projects in these courses and locate and nurture internship opportunities for our students.
- Provide more expertise in our existing programs

  Depending on the area of expertise, a new faculty member could greatly benefit our existing programs. For example, an individual with expertise in secondary math education would be able to take over upper-level education-specific courses we typically offer as overloads (MATH 340 and 360). This would allow our existing faculty to concentrate on their areas of expertise.
- Attract more students and better serve existing students by shifting focus towards applied math, statistics, or actuarial science

  Over the past few years, we've seen an increase in demand (from past, current, and prospective students) for programming in statistics and actuarial science. An additional faculty member would allow us to further explore opportunities in these areas. With a single full-

time faculty member, we could easily offer a major in statistics (without adding a single new course) and improve the coordination of statistics courses around campus (especially STAT 213). A statistician would be able to teach our General Education courses, our service courses to STEM majors, our upper-level statistics courses, and sections of STAT 213. A statistician could also contribute to the university by working with institutional research and assessment or by further developing the center for statistical consulting on campus. A statistician would also assist the campus as a whole by providing additional expertise for students and faculty completing research.

- Allow our faculty the option to apply for a sabbatical

  Currently, our faculty feel as though they cannot even apply for a sabbatical because our department is unable to claim the ability to cover the courses for any faculty member on leave.

A 20% increase in non-personnel resources (travel, office supply, professional development funds), would still put us at a level lower than our 2007-08 budget. Our current budget is an embarrassment and our budget lines have become useless (for example, we have a total travel budget of $750 to split among 5 full-time faculty). We don't have enough money to buy software, pay professional dues, or attend conferences, so we've cut-back on all our spending. This, unfortunately, has meant that our budgets continue to decrease each year. We need to break this downward spiral. Additional funding for travel would allow us to attend conferences (and maybe even invite our majors to local conferences). Additional funds would also give us the opportunity to purchase research materials (including specialized software for math and statistics) and actually have an opportunity to plan for the future.

- Explain how the program(s) would function with the reduction of:
    a. up to 20% in personnel (to include FT, PT, student workers, GAs)
    b. up to 20% in non-personnel resources

We're familiar with finding ways to function with reduced resources. Since 2002-03, staffing within our department has declined by 17% (including a 50% reduction in the number of tenure-track faculty). On top of this, our part-time salary budget, in recent years, has dropped by more than 60% (from $40,000 in 2009-10 to $15,000 in 2012-13). And, as the following table shows, our discretionary budget (total budget minus personnel and required telephone costs) has declined by an average of 8.5% each year since 2007-08.

	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	Average Annual Change
Office Supplies	*7,794	2,100	3,700	3,700	2,800	2,800	+7.5% since '08
Equipment	525	500	1,000	700	500	500	(-1.0%)
Food		250	350	350	800	250	--
Postage		250	100	100	100	100	(-20.5%)
Publications & Dues		1,625	400	200	500	500	(-25.5%)
Travel		1,000	1,000	900	1,000	750	(-6.9%)
Other Supplies		264	200	200	200	200	(-6.7%)
Staff Development		500	300	150	200	200	(-20.4%)
Total	8,319	6,489	7,050	6,300	6,100	5,300	(-8.5%)

* Office Supply budget in 2007-08 was used for everything except equipment. This value is not used to calculate average annual change.

To handle increasing institutional enrollments with reduced resources, we've cut back our service to our majors and the institution. For example, over the past 10 years, we've reduced the number of courses we offer by 36% (from 33 to 21 courses). We did this by adjusting our major requirements, eliminating all but two of our General Education courses, moving our developmental math program to an online course, and by offering (oftentimes unpaid) independent studies to majors who need upper-level courses. Over this same period, we converted a 0.25 FTE instructional staff member to a 1.00 FTE adjunct assistant professor.

We also cut back on opportunities for our faculty. Our travel and publications and dues budgets have reached the point where it's difficult for us to put them to use. We've significantly cut back on travel to professional conferences, which has also had the effect of eliminating opportunities for our majors to attend and present at conferences. Our publications and dues budget has declined enough that we use our own professional development money to pay for dues. Our office supplies budget, now covering little more than our required printing/copying charges, has also reached a level where it has become all but useless. While we've been able to operate with budget reductions, we've reached the point where our budget has severely limited our ability to offer effective programs.

To staff our programs, we currently have:

- 3 full-time, tenured faculty members (2.75 FTE)
- 1 full-time non-tenure-track faculty member (1.00 FTE)
- 1 full-time visiting faculty member (1.00 FTE)
- 0-5 adjunct faculty each semester (covering anywhere from 0 to 21 credits in a given semester)
- 2 work study students

Our programs could not function with a reduction in faculty. While adjunct faculty could potentially be used to cover all courses for non-majors, it would not make sense to offer a Bachelor's level program in mathematics with fewer than 3 full-time tenure-track faculty. In order to offer our developmental, General Education, and major programs, we need to maintain at least 5 full-time faculty members.

If we absolutely needed to eliminate a full-time position, our major programs could continue to function by doing at least one of the following:

- Increase class sizes in our General Education courses from 26 to at least 34 students per section

  This option, which would allow us to offer at least 5 fewer sections each year, could have a negative impact on student achievement. It would also make it more difficult to find classrooms for our General Education courses.
- Reduce course requirements for the B.S. in Secondary Mathematics Education to a level that still meets the minimum requirements set by Iowa and Illinois (eliminating MATH 220, 301, 370, 399, and 395)

  This would allow us to offer 17 fewer credits per year. This would noticeably reduce the preparation of our graduates and would undermine the work we've done to ensure our math education majors take the same courses as our math majors. With our secondary math education majors now needing to pass the Praxis II exam, it would not be wise to reduce their course requirements.
- Hire adjunct faculty to teach virtually all of our General Education courses

  This would reduce salary expenses by at least 20%, but would negatively impact student achievement and make it virtually impossible to attract potential majors. We cannot handle more adjuncts.
- Reduce our math placement standards and/or General Education requirements

  If we reverted back to our previous placement standards (in place until 2011-12), we could eliminate up to 7 sections of developmental and General Education courses per year. This would, obviously, have a negative impact on the quantitative problem solving skills of our graduates.

Each of those options will negatively impact student achievement. Some other options that may not negatively impact student achievement include:

- Implement a multi-stage placement testing strategy

  We're actively looking into a new placement test that allows students to (a) take an initial placement test, (b) take up to 6 weeks to learn, review, and remediate any deficiencies, and (c) take a final placement test that determines which math course they take. By giving students an opportunity to increase their placement score (and, thereby, skip ahead 1-2 math courses), we may be able to reduce the number of developmental and General Education courses we offer each year. If this worked, it would have no negative impact on student achievement (although it may make it more difficult to attract math majors, since higher-ability students could fulfill institutional requirements without taking a math course at SAU).
- Offer MATH 171 and QUANT 131 as (mostly independent) online courses using ALEKS (like our current MATH 099)

If we could offer these courses like our current MATH 099, we could (potentially) eliminate the equivalent of 10 sections per year. Internal and external assessment of these ALEKS courses provides evidence that students actually learn more (and achieve at a higher level) than in traditional instructor-led courses.

While we are actively looking into ways to offer more of our courses online (which could reduce personnel costs), we do not believe we can continue to offer our two majors programs with any reduction in staffing. In a sense, we've already reduced our staffing levels. In both 2010-11 and 2011-12, we were approved to hire a tenure-track position. Since we did not hire that position, we've, in essence, reduced our staffing by nearly 20%. One negative consequence of our bare-bones staffing is that our faculty feel as though we cannot even apply for sabbaticals (since we cannot claim to be able to cover the courses for a faculty member on sabbatical).

We currently hire between 2 and 2.5 work study students each semester. Prior to this year, we may have been able to eliminate one of those positions without any negative impact on our programs. Beginning this year, however, our work study students have become vital to the success of our developmental math program (MATH 099). Reducing our work study allocation could reduce student achievement in our developmental math program.

Any reduction in our non-personnel resources would also make it difficult to continue offering our two major programs, the developmental math program, and our General Education courses. As was shown earlier, our discretionary budget has been trimmed to a level that does not even meet our current needs. Reducing it further would all but eliminate professional development opportunities for our faculty.

One resource that we do currently have in abundance is office space. Because we did not hire another faculty member in 2010-11 or 2011-12, we have one extra office space that could be repurposed.

RECOMMENDATION FOR REALLOCATION

Consider the following question as you conclude this report. If the program were to start anew today and in order to be most effective and efficient in its service and in its use of current intuitional resources, what would it look like?

- Based on this report and the direct dealings of this program(s), please state any specific ideas/recommendations for enhancements or reductions for each of the program(s) discussed in this report in the chart below. Include projected costs or cost-savings.

Idea/Recommendation	Description of Enhancements/Reductions
Eliminate the Secondary Teacher's Certificate with a Minor in Mathematics program.	Last year, we discussed this program with faculty in the Teacher Education Program. For at least the last 10 years, no students have enrolled in this program. No one really knows the purpose of this program, either, and it's uncertain whether this program meets state requirements for licensure. Eliminating this program will have no impact on students, staffing, or resources (other than saving some space in the Catalog).
Implement the ALEKS placement testing system for incoming freshmen. Offer MATH 099, QUANT 131, and MATH 171 as low-cost, independent, online learning experiences during the winter and summer terms.	After 5+ years of negotiations and planning, we'll finally be ready to administer a placement test to incoming freshmen in the summer of 2014. McGraw-Hill has given us approval to join the regents universities in Iowa in administering the ALEKS placement test. For $20-25 per student, we could administer the placement system to all incoming freshmen, incoming freshmen with ACT scores below a certain threshold, or all incoming freshmen and transfer students. The cost could be covered by an increase in orientation fees, an increase in tuition, or a reduction in staffing costs as a result of the placement test. In the ALEKS placement test, students would come to SAU to take an initial placement exam online. Immediately after taking the exam, students would learn of their placement. If a student was satisfied with that placement, that student could enroll in the appropriate course. Students who are not satisfied with this initial placement would be given up to 6 weeks of free access to the ALEKS system (for no additional cost) to review content and remediate any deficient skills. At the end of those 6 weeks (or at a deadline set prior to classes starting), students would be given another opportunity to take a placement exam. Thus, motivated students study intensively during those 6 weeks and place out of our General Education math requirement. While the up-front cost of administering this placement system (the $20 fee per student, the availability of computers on campus, the time needed for the testing) is high, students benefit greatly from this type of placement. We would also get much more detailed assessment information on our incoming freshmen and could cater our instruction towards the individual needs of students in our developmental and General Education courses. It's difficult to predict, but a conservative estimate would be that this placement system could save us at least 3 sections per academic year. From a student's point-of-view, it could save them up to 6 credits of required mathematics courses. In addition to the placement test, we can also facilitate our students' attainment of our quantitative problem solving outcome by offering ALEKS versions of our MATH 099, QUANT 131, and MATH 171 courses during the winter and summer terms. In these courses, students work completely independently (with assistance from an adaptive learning system, an ebook, online videos, and

multiple examples) to fulfill course outcomes. We would simply need to set-up the courses (which could be accomplished in a single day), have someone assigned to email students periodically (to motivate students and answer any questions), and assign an instructor to certify the results of the final assessment. Since these courses require very little administrative and instructional support (and can, in fact, be offered with virtually no support), we could allow students to take these courses without paying tuition costs. Instead, we could charge a small course fee (on top of the cost of materials which is currently around $90).

These online course offerings in the summer and winter would allow us to compete with community colleges and online universities in terms of price. It may be a much more attractive option to students than paying for 3 credits for our MATH 099 course (credits that do not count towards graduation) or QUANT 131/MATH 171 courses. By allowing us to assess course outcomes, we would much rather offer our own versions of these courses than have students take the equivalent courses at other online universities or community colleges.

Again, it's almost impossible to predict the popularity of these courses and the impact on staffing costs and revenues. We could, however, easily limit the size of these online offerings to make things a bit more predictable.

By giving students the option to take lower-cost online versions of our courses during the summer and winter terms, we should be able to reduce our reliance on adjuncts. We don't have enough information to predict the impact on revenues. Ignoring the impact of zone-tuition, we'd (potentially) lose 3 credit hours of tuition from every student who took the online course. Offsetting that lost revenue would be the reduced cost of staffing and the revenue generated from the course fee paid by students. It's unknown whether the revenue would be completely lost, as students may simply decide to take another elective or required course on campus during the Fall and Spring semesters. Also, there's no reason why we couldn't increase revenues by offering this online course to students outside of St. Ambrose.

-- March update --
Recent trends support the idea of moving our developmental and General Education courses online (and charging a course fee instead of full tuition). Coursera recently announced 3 math courses (equivalent to our MATH 099, 171, and 191) offered by some of its 62 partner universities are now ACE CREDIT recommended[1]. While we don't know how much the online proctored final exams will cost, these courses will undoubtedly grow in popularity. St. Ambrose is listed as a university that "considers ACE CREDIT recommendations in determining the applicability to their course and degree programs," so there's no reason why we shouldn't accept these credits.

The availability of these low-cost, credit-worthy, online courses (including the equivalent of our STAT 213, QUANT 131, STBE 237 offered through ALEKS[2]) should motivate us to provide our students with similar opportunities at comparable prices.

Sources:
1 http://blog.coursera.org/post/42486198362/five-courses-receive-college-credit-recommendations
2 http://www.aleks.com/about_aleks/ace_credit

Become the Department of Mathematics and Statistics, add a statistics minor, add a statistics or actuarial science major, and coordinate the statistics courses around campus	With our current statistics courses (STAT 300, STAT 301, STAT 305) and other courses with significant probability and statistics components (MATH 171, 191, 290, 395, 400), we're already positioned as a department that offers mathematics and statistics learning experiences. The expertise of our faculty, the post-graduation plans of our majors (2 recent graduates in Ph.D. programs in statistics; 2 recent graduates working in actuarial departments of local insurance companies), the interests of potential students (at least 4 potential students interested in statistics and actuarial science each year), and the large enrollment in statistics courses around campus (which have been designed as terminal statistics courses) all point to the need for a centralized coordination of statistics courses and programs at SAU. We have a ready-to-implement plan that allows for the coordination and reinvigoration of STAT 213, the development of a B.S. in Statistics program that meets recommendations of the American Statistical Association, the development of minors in statistics, and the development of an interdisciplinary minor in data science all at minimal cost. This plan has been shared with Dr. Aji and is available upon request. At no cost, we can change the name of our department and coordinate STAT 213. With so many students taking STAT 213 (psychology, biology, exercise science, nursing), the course has grown beyond its initial development as a statistical methods course for the social sciences. STAT 213 could benefit from a focused coordination of staffing, assessment, and student learning outcomes to align with recent research-based approaches (AIMS, GAISE report, ISI, Amstat recommendations, etc.). The Chair of our Department has served as an advisor to NSF-funded curriculum development for introductory undergraduate statistics courses, so we have student learning outcomes, curricular materials, and training opportunities ready-to-go. By aligning STAT 213 with high school statistics courses and subsequent statistics courses, this coordination would allow STAT 213 to serve as the foundation of a major, minors, and GenEd SICs in statistics. Looking through the Catalog, it looks like we currently offer a few dozen statistics-, research-, or data-focused courses that could contribute to interdisciplinary minors or concentrations. Nationally, enrollment in introductory and upper-level undergraduate statistics courses has increased by more than 50% over the past decade[1]. This is due, in part, to increasing enrollment in high school statistics courses[2]. Enrollment in AP Statistics courses has more than tripled over the past decade, with more than 150,000 high school students taking the course each year[3]. We've seen a similar increase in enrollment in our STAT 213 and MATH/STAT 300 courses over the past decade. Based on these national trends, increasing salaries and demand for statisticians and actuaries, and our conversations with current and prospective students, we have every reason to believe demand exists for a major in statistics. We could develop, maintain, and assess a major in statistics at minimal cost. In fact, we could offer a B.A. or B.S. in statistics that meets the recommendations of the American Statistical Association without adding a single new course. As an example, the following course requirements would surpass Amstat recommendations: Mathematical Background (Calculus): 8 credits MATH 191, MATH 192 Linear Algebra: 3 credits MATH 290

Introduction to Statistics:	3 credits	STAT 213
Probability & Statistical Inference:	3 credits	MATH/STAT 300
Statistical Modeling:	3 credits	MATH/STAT 301
Statistical Computing:	3 credits	MATH/STAT 305
Computer Programming:	3 credits	CSCI 195
Advanced Topics (Bayesian, Multivariate):	3 credits	MATH 400
Capstone Course:	1 credit	MATH 395
Elective:	None required	MATH 291, 340, CIS Database courses, Graphic design, Engineering
Coordinated courses in substantive area:	0-21 credits	Individualized Interdisciplinary Minor, GenEd Sic, Minor
Total:	30 credits, plus the coordinated courses that may meet GenEd requirements	

Because it utilizes our existing courses, this major would require very few additional resources. Enrollments in our existing courses would increase, but (unless this program became wildly successful) we would not need to offer additional sections of these courses (with the possible exception of running a section of MATH/STAT 305 each year).

With these course requirements, a student entering St. Ambrose with a desire to major in mathematics, mathematics education, computer science, industrial engineering, or mechanical engineering would, after their sophomore year, still be able to switch to a statistics major and graduate on-time. Requiring students to complete an individualized interdisciplinary minor as part of the major would not only satisfy Amstat recommendations; it would also allow students to integrate General Education courses with other areas of interest to fulfill major requirements, minor requirements, and General Education requirements.

This statistics major could be developed and maintained with existing resources. Ideally, we would hire a full-time faculty member (within the Mathematics Department or in coordination with the Department of Computer and Information Sciences) to help run the program, teach statistics and computer science courses, and advise students.

With a full-time faculty member (or faculty member shared with CIS), we could also design minors and/or interdisciplinary minors in statistics, data science, and related areas. These minors could incorporate existing statistics courses (STAT 213, STBE 237, MATH/STAT 300/301/305) to allow students who enjoy these courses to continue their study of statistics.

1 http://magazine.amstat.org/blog/2012/11/01/elementarystats/
2 http://magazine.amstat.org/blog/2012/08/01/prescornerundergradstats/
3 http://en.wikipedia.org/wiki/Advanced_Placement_Statistics

Meet with the Teacher Education Program and other interested stakeholders to determine if secondary math education is a priority at SAU	Although we have approximately 20-30 secondary math education majors at any given time, this program has not been a priority for the institution. The Math Department has no faculty specializing in math education and the Teacher Education Program has one faculty member who specializes in elementary math education. Without a champion to coordinate and teach classes within the program, we worry about the quality of graduates being produced. If we decide that keeping the Secondary Math Education major is a priority (based on internal and external demand), then we need resources and a plan to improve the program. If, on the other hand, we decide this program is not a priority (based on current resource levels), then we should discuss eliminating the major.

Place additional narrative comments below if space is needed. Not to exceed one additional page.

*Initial approval timeline may vary by Dean or VP. Contact him or her directly for timeline and progress expectations.