EPC - December 6, 2011
Math Department Proposals

Proposed Changes to Mathematics Education Major Requirements

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;
one course from MATH 291, 301 or 305, 320, 370, 380;
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.

Proposed Catalog Descriptions:

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

Impact: To get a B.S. in Secondary Math Education, students must currently complete 76-77 credits:

MATH	CSCI	EDUC	SPED	Other
(4) 191	(3) 195	(2) 205	(3) 310	(3) History/US Govt
(4) 192	(3) Elective	(3) 284		
(3) 220		(3) 300		
(3) 290		(3) 301		
(3) 300		(2) 305		
(0) 338		(3) 308		
(3) 340		(3) 309		
(3) 360		(1) 338 (listed as MATH)		
(3) Elective		(12) 419		
(3) Elective				
(3-4) Elective				
32-33 credits	6 credits	32 credits	3 credits	3 credits

Grand Total: 76-77 credits

The proposed changes would still require 77 total credits:

MATH	CSCI	EDUC	SPED	Other
(4) 191	(3) Programming	(2) 205	(3) 310	(3) History/US Govt
(4) 192		(3) 284		
(3) 220		(3) 300		
(3) 290		(3) 301		
(3) 300		(2) 305		
(3) 301		(3) 308		
(3) 340		(3) 309		
(3) 360		(1) 338		
(3) 370		(12) 419		
(3) 380				
(1) 395				
(3) 399				
36 credits	3 credits	32 credits	3 credits	3 credits

Grand Total: 77 credits

1) Eliminate 3-credits of computer science

Proposal: Replace "six credits in computer science including CSCI 195 and another CSCI elective" with "3 credits in computer programming."

Impact: This 3-credit reduction would be offset with a 3-credit increase in math requirements (MATH 399). This change may slightly lower enrollments in CSCI elective courses (CSCI 120 was a popular choice).

Rationale: This proposed change meets Iowa state requirements for an endorsement in K-8 or 5-12 mathematics ("a computer programming course" -- see http://www.state.ia.us/boee/addition.html). Replacing 3-credits of CSCI with 3-credits of MATH will improve our majors' content knowledge and better prepare them to teach.

Support: Statement from CSCI Chair (program review, p. 5)

2) Identify upper-level elective courses

Proposal: Replace "three courses from MATH 291, 301 or 305, 320, 370, 380, 400" with "MATH 301, 370, and 380"

Impact: This will allow us to schedule a more consistent rotation of courses. It will also increase staffing efficiency by reducing the number of under-enrolled upper-level courses we offer (as regular courses or independent studies).

Rationale: To truly understand the content they are intended to teach, all Math Education majors should complete coursework in Real Analysis, Abstract Algebra, and Statistics. This will more closely align our curricular requirements for math and math education majors.

Support: The Department fully supports this proposed change.

3) Require MATH 395 and MATH 399

Proposal: Require Math Education majors to complete MATH 395 (1 credit) and a new course, MATH 399 (3 credits)

Impact: This will increase enrollment in MATH 395, which is currently required for math majors (and not required for math education majors). It will also require us to create a new course, MATH 399.

Rationale: By giving us the opportunity to administer the Major Field Test in Mathematics, assign substantial mathematics-based projects, and mentor our students while they teach and reflect on their effectiveness, this proposal will allow us to better assess the content knowledge of our majors and remediate any weaknesses prior to student teaching. This will also better prepare our students to successfully complete the Illinois Certification Tests in math. It will also allow us to more clearly identify our strongest majors to potential employers (by writing a letter to any student who outperforms the national average on the Major Field Test).

Support: The Department fully supports this proposed change.

4) Remove MATH cross-listing of EDUC 338

Proposal: No longer cross-list EDUC 338 as MATH 338.

Impact: No longer cross-list EDUC 338 as MATH 338 to better represent course content and outcomes

Rationale: The content and outcomes of this course clearly align with the outcomes of the Teacher Education Program.

Support: Statement from TEP Director (program review, p. 5)

5) Require a grade of B or better in MATH 191 and 192

Proposal: Require Secondary Math Education majors to complete MATH 191 and 192 with a grade of B or better.

Impact: Secondary Math Education majors who do not earn a B or better in MATH 191 and 192 will either need to retake those courses or change majors. This will ensure our secondary math education majors have the skills and conceptual knowledge to successfully complete the program. This will also ensure our majors meet the Teacher Education Program GPA requirements for acceptance.

Rationale: Many students experience college-level mathematics for the first time in MATH 191 and 192 (Calculus I and II). Students who struggle in these courses always struggle in the 28 subsequent credits of higher-level math. Setting this standard will communicate to students that a fondness and facility with high school-level mathematics is not enough to major in secondary math education -- majors need strong conceptual understanding of college-level math.

For admission to the Teacher Education Program, potential secondary math education majors must have a 3.0 GPA and grades of C or above in courses required for the major. This proposal will virtually guarantee that our majors will meet these admissions standards. It will also alleviate the problem of students (unsuccessfully) taking even higher-level math courses when they would be better served reviewing and retaking MATH 191 and 192.

Support: Statement from TEP Director (program review, p. 5)

Impact of Math Education proposals on state requirements

Source: Iowa Board of Educational Examiners Requirements for Teaching Endorsements
http://www.state.ia.us/boee/addition.html

Requirements: Completion of 24 semester hours in mathematics to include:

- A linear algebra or abstract (modern) algebra course
- A geometry course
- A 2-course sequence in calculus
- A computer programming course
- A probability and statistics course
- Coursework in discrete mathematics
- A course in the methods of teaching mathematics is required in addition to the 24 hours

The following table demonstrates how our proposed changes still fulfill Iowa BOEE requirements:

State Requirement	SAU Required Course(s)	Credits
A linear algebra or abstract (modern) algebra course	MATH 290: Elementary Linear Algebra	3
	MATH 380: Abstract Algebra	3
A geometry course	MATH 360: Modern Geometry	3
A 2-course sequence in calculus	MATH 191: Calculus & Analytic Geometry I	4
	MATH 192: Calculus & Analytic Geometry II	4
	MATH 370: Real Analysis	3
A computer programming course	CSCI Programming	(3)
A probability and statistics course	MATH/STAT 300: Modern Intro to Probability & Statistics	3
	MATH/STAT 301: Linear Regression & the GLM	3
Coursework in discrete mathematics	MATH 220: Introduction to Logic & Proof (We incorporate discrete mathematics in our courses, similar to how discrete math is incorporated into other Common Core Standards)	3 . .
A course in the methods of teaching math	MATH 340: Secondary Math Methods	(3)
	MATH 399: Postsecondary Clinical Teaching Experience	3
(additional credits)	MATH 395: Seminar in Mathematics	1
24 credits in math (not counting teaching course)		33

The following two pages display major audit worksheets under current requirements (page 6) and proposed requirements (page 7):

Current major requirements:

St Ambrose University | Major Audit Worksheet | Catalog 2011-2013

Name: _____ Advisor: _____ Major: Math 5-12 Teacher Education
Soc Sec #: Date of Audit:

Req Crs	General Education Requirements	Credits Needed
	COLLEGE LEVEL SKILLS:	
3	**Written Comm** (Engl 101) with "C" or better	
2-3	**Oral Comm** (101,110, 203, 328, 329) with "C" or better	
3	**Math** (131, 151, 210 or Stat 213) with "C" or better	
2-3	**Physical Education** Kin 149 Activity Course or Samaritan Course(Kin 206,300,400)	
1	**Information Literacy**: IL 101	
3-11	**Foreign Language**- 3 yrs same HS language or college level language through equivalent of 201	
	LEVEL I & II REQUIREMENTS:	
2-3	**Creative Arts-** 1 yr applied music or 1 course	
5-7	**Humanities -** 2 Departments	
2-3	**Social Sciences**	
3-4	**Natural Sciences**	
12	**Philosophy & Theology** 3 crs from:Theo 101, 201, 202, 215, 219, 240, 250, 345,346 3 crs from : Phil 101, 201, 207, 208, 210, 217 6 crs from Cath Studies, Phil, or Theo (one @ 300+ level) :	
	Multidisciplinary *Option A*: One additional course from each of the following: Humanities, Social Science, and Natural Science	
	Option B: Interdisciplinary Minor	
	Option C: 2nd major from College of Arts & Science or Econ	
30	**300+ Level Courses** (any dept except varsity athletics) Only 42 crs in major dept count toward 120 crs	

SOM _____ **WI 1.**_____ **WI 2.**_____

CUM GPA_____ SAU GPA_____ Major GPA_____
SAU Crs Completed:_____
CLEP/Expr Lrn_____
Transfer Crs: _____
"I"or"X" Grades:_____

Current Enrollment: (FL)_____
(SP)_____(SUM)_____ **TOTAL:**
Minus:
Crs Over 42 Limit:_____
Current Repeat Crs:_____ **NEED:**

Major Requirements	Credits Needed	Grade
33 Credits in Mathematices including:		
Math 191		
Math 192		
WI-Math 220		
Math 290		
Math 300		
Math 338		
Math 340		
Math 360		
Three courses from: Math 291, 301, 305, 320, 370, 380 or 400		
Six Computer Science Credits:		
CSCI 195		
CSCI Elective		
At least one of the following: Bio1 199, Chem 105, Phys 203 or Phys 251		
Entrance GPA's to Educ. Prog. & Student Teaching: CUM GPA 2.7; Major GPA 3.0; Educ Coursework GPA 3.0		
Educ 205 or 207 (Need "B")		
Sped 310		
U.S. Hist or Amer Govt:		
Educ 284		
Educ 300		
WI-Educ 301		
Educ 305		
Educ 338		
170 crs of pre-std-teaching field exper's at two different school sites.		
Educ 308		
Educ 309		
Educ 419 (see above GPA requirements)		
Illinois Middle School/Jr.High Requirement - Optional in Iowa:		
Educ 455		
Educ 461		

Note: All major and educ courses need "C" or better.

	A	E	P
Transfer:	_____	_____	_____
SAU:	_____	_____	_____
TOTALS:	_____	_____	_____

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Proposed major requirements

St Ambrose University | Major Audit Worksheet | Catalog 2011-2013

Name: _____ Advisor: _____ Major: Math 5-12 Teacher Education

Soc Sec #: Date of Audit:

Req Crs	General Education Requirements	Credits Needed
	COLLEGE LEVEL SKILLS:	
3	**Written Comm** (Engl 101) with "C" or better	
2-3	**Oral Comm** (101,110, 203, 328, 329) with "C" or better	
3	**Quantitative** Problem Solving course	
2-3	**Physical Education** Kin 149 Activity Course or Samaritan Course(Kin 206,300,400)	
1	**Information Literacy**: IL 101	
3-11	**Foreign Language**- 3 yrs same HS language or college level language through equivalent of 201	
	LEVEL I & II REQUIREMENTS:	
2-3	**Creative Arts-** 1 yr applied music or 1 course	
5-7	**Humanities -** 2 Departments	
2-3	**Social Sciences**	
3-4	**Natural Sciences**	
12	**Philosophy & Theology** 3 crs from:Theo 101, 201, 202, 215, 219, 240, 250, 345,346 3 crs from : Phil 101, 201, 207, 208, 210, 217 6 crs from Cath Studies, Phil, or Theo (one @ 300+ level) :	
	Multidisciplinary *Option A*: One additional course from each of the following: Humanities, Social Science, and Natural Science	
	Option B: Interdisciplinary Minor	
	Option C: 2nd major from College of Arts & Science or Econ	
30	**300+ Level Courses** (any dept except varsity athletics) Only 42 crs in major dept count toward 120 crs	

SOM _____ **WI 1.**_____ **WI 2.**_____

CUM GPA_____ SAU GPA_____ Major GPA_____
SAU Crs Completed:_____
CLEP/Expr Lrn_____
Transfer Crs: _____
"I"or"X" Grades:_____

Current Enrollment: (FL)_____
(SP)_____(SUM)_____ **TOTAL:**
Minus:
Crs Over 42 Limit:_____
Current Repeat Crs:_____ **NEED:**

Major Requirements	Credits Needed	Grade
36 Credits in Mathematics including:		
Math 191 (Need "B")		
Math 192 (Need "B")		
WI-Math 220		
Math 290		
Math 300		
Math 301		
Math 340		
Math 360		
Math 370		
Math 380		
Math 395		
Math 399		
3 credits in computer programming		
CSCI Programming		
Entrance GPA's to Educ. Prog. & Student Teaching:		
CUM GPA 2.7; Major GPA 3.0; Educ Coursework GPA 3.0		
Educ 205 or 207 (Need "B")		
Sped 310		
U.S. Hist or Amer Govt:		
Educ 284		
Educ 300		
WI-Educ 301		
Educ 305		
Educ 338		
170 crs of pre-std-teaching field exper's at two different school sites.		
Educ 308		
Educ 309		
Educ 419 (see above GPA requirements)		
Illinois Middle School/Jr.High Requirement - Optional in Iowa:		
Educ 455		
Educ 461		

Note: All major and educ courses need "C" or better.

	A	E	P
Transfer:	_____	_____	_____
SAU:	_____	_____	_____
TOTALS:	_____	_____	_____

7/18/11

Proposed Changes to Mathematics Major Requirements

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.

Proposed Catalog Descriptions:

Requirements for a Bachelor of Science with a Major in Mathematics Education:

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.

Impact: This will maintain a 40 credit hour requirement for the B.S. in Mathematics.

1) Require MATH 291; reduce electives from 3 to 2 courses

Proposal: Require MATH 291; require only two courses from MATH 291, 301 or 305, 371, 375, 381, 400

Impact: This will strengthen enrollment in MATH 291, which is also required by the Industrial and Mechanical Engineering programs. It will also strengthen the preparation of our majors for graduate school. It will not increase the number of credits required for the major.

Rationale: Mathematics majors should complete a 3-semester sequence in Calculus.

Support: The Department fully supports this proposed change.

2) Eliminate MATH WI-396.

Proposal: Eliminate MATH WI-396.

Impact: This course is removed from the Catalog and the requirements for a B.S. in Mathematics.

Rationale: The Department was not satisfied with the outcomes students could attain in a second 1-credit seminar course. MATH 395 will be strengthened.

Support: The Department fully supports this proposed change.

3) Change the wording of the 3-credit computer science requirement.

Proposal: Replace "CSCI 195 or another approved computer programming language" with "3 credits in computer programming".

Impact: None.

Rationale: This will make the wording more consistent with the Math Education description. It will also clarify that CSCI 195 is not preferred over other programming languages.

Support: Statement from CSCI Chair (program review, p. 5)

Proposed Changes to Mathematics Minor Requirements

Proposal: Eliminate the phrase, "at least two courses from: MATH WI-220, 291, 301 or 305, 320, 370, 380." Require MATH 291: Calculus III and MATH 320: Ordinary Differential Equations

Current Catalog Descriptions:

Requirements for a Minor in Mathematics:

20 credits including MATH 191, 192, 290, 300

at least two courses from: MATH WI-220, 291, 301 or 305, 320, 370, 380

Proposed Catalog Descriptions:

Requirements for a Minor in Mathematics:

21 credits including MATH 191, 192, 290, 291, 300, 320

Impact: This will increase the credits required for a Minor from 20 to 21. It will strengthen the minor and facilitate scheduling.

Rationale: A well-rounded minor in mathematics should include a 3-semester Calculus sequence and ordinary differential equations. This will also encourage students to finish the minor, rather than waiting for their desired elective.

Support: The Department fully supports this proposed change.

Required courses by program

If the proposed changes to the mathematics major, mathematics education major, and mathematics minor are approved, each program will require the following courses:

Course	Mathematics Major	Math Education Major	Teaching Certificate	Mathematics Minor	Engineering I.E. / M.E.
MATH 191: Calculus I	√	√	√	√	√ / √
MATH 192: Calculus II	√	√	√	√	√ / √
WI-MATH 220: Logic & Proof	√	√	√		
MATH 290: Linear Algebra	√	√		√	√ / √
MATH 291: Calculus III	√			√	√ / √
MATH 300 / STAT 300	√	√	√	√	√ / √
MATH 301 / STAT 301	(elective)	√	√		
MATH 305 / STAT 305	(elective)				
MATH 320: Differential Equations	√			√	√ / √
MATH 340: Secondary Methods		√	√		
MATH 360: Modern Geometry		√	√		
MATH 370: Real Analysis	√	√			
MATH 371: Real Analysis II	(elective)				
MATH 375: Complex Analysis	(elective)				
WI-MATH 380: Abstract Algebra	√	√			
MATH 381: Abstract Algebra II	(elective)				
WI-MATH 395: Seminar	√	√	√		
MATH 399: Clinical Experience		√	√		
MATH 400: Topics	(elective)				
CSCI Programming	√	√	√		

By eliminating several electives and identifying more required courses, the programs become more closely aligned. This will facilitate scheduling, as we'll be able to offer fewer under-enrolled elective courses. In fact, with these proposed changes, 14 of our 19 upper-level courses will be required by at least two programs. We will still have 5 courses to serve as elective options for our Mathematics Majors.

Required by at least 3 programs: 191 192 220 290 291 300 320 395
Required by 2 programs: 301 340 360 370 380 399
Required by no programs: 305 371 375 381 400

Eliminate the institutional "mathematical reasoning" requirement

Proposal: Eliminate the institutional "mathematical reasoning" graduation requirement.

The Catalog identifies the following degree requirements (page 18 of the 2011-13 Catalog):

3C) Proficiency in Mathematical Reasoning Skills may be demonstrated:

- By passing with a grade of C or better, MATH 131: Math for Liberal Arts, or any higher numbered course offered by the Mathematics Department, or
- By passing with a grade of C or better, STAT 213: Applied Statistical Reasoning for the Sciences, or
- By passing with a grade of C or better, CSCI 281: Discrete Structures, or
- By earning college-level math credit through CLEP or AP tests, or
- Through high school coursework and math ACT scores as approved by the Math Department

We propose eliminating this section and replacing it with clarification that students must meet institutional requirements related to the General Education student learning outcome, "Use quantitative information to solve problems."

If we wanted to keep a statement similar to the current Catalog description, we could use:

3C) The ability to use quantitative information to solve problems may be demonstrated:

- By passing any course identified as addressing the General Education outcome (QUANT 113, QUANT 131, MATH 152 or higher, STAT 213, CSCI 281, any other course approved for GenEd)
- By earning college-level math credit through CLEP or AP tests, or
- Through high school coursework and math ACT scores as approved by the Math Department

Impact: A greater number of courses address the "quantitative problem solving" outcome than the current "mathematical reasoning" requirement. Therefore, this proposed change would give students more options/ opportunities to meet institutional requirements. It may also encourage other departments to create and offer courses to fulfill the General Education student learning outcome. EPC, with guidance from the General Education Committee, would identify the courses that address the outcome.

Mathematically-weak students (those with ACT Math scores of 17 or lower) need at least 6 credits to fulfill the current mathematical reasoning requirement (MATH 095 and another course). This proposed change would allow all students to fulfill the requirement through a single 3-credit course (QUANT 113 and QUANT 131, for example, have no prerequisites). Students in majors that require mathematics courses would not be impacted.

This proposed change may reduce enrollment in our lower-level courses, specifically the courses that are not identified as requirements or prerequisites for other majors. We encourage other programs/departments to evaluate the math courses they identify as requirements or prerequisites.

Rationale: The General Education program does not have a "mathematical reasoning" student learning outcome, so it does not make sense to have an institutional mathematical reasoning degree requirement. Also, listing STAT 213 and CSCI 281 in the Catalog demonstrates that we do not currently have a purely mathematics-related requirement. Therefore, this proposal would better align institutional requirements with institutional student learning outcomes and current practices.

Mathematics, the science of patterns, is a discipline with its own structured language. Quantitative problem solving represents quantitative and logical skills that can be applied to real problems.

Support: Statement from General Education Director (program review, p. 20)

Modify AP Calculus credits awarded

Proposal: Modify the number of credits awarded for AP Calculus exam performance as follows:

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

Source: http://web.sau.edu/registration/forms&pdfs/APScores.pdf

Impact: This will reduce the number of credits awarded to students completing the AP Calculus exam. It may slightly increase enrollment in our MATH 191, 192, and 291 courses. It could, potentially, reduce an incentive for students to major in programs that require Calculus.

Rationale: The AP course curricula and AP exam specifications (http://apcentral.collegeboard.com/apc/public/repository/ap-calculus-course-description.pdf) show that Calculus AB outcomes align with MATH 191 and Calculus BC outcomes align with MATH 192.

Students successfully completing AP Calculus AB have not had experience with the material in MATH 192. Likewise, students successfully completing AP Calculus BC have not had experience with the material in MATH 291. Because of this, the proposed changes award credits for the actual content learned by students (the outcomes demonstrated by students).

Support: Statement from Maureen Baldwin (program review, p. 20)

Modify institutional math placement standards

Proposal: Modify the institutional math placement standards as follows:

Old Standards	Proposed Standards	
ACT Math ≤ 17: Students placed in MATH 095	ACT Math ≤ 21:	Students can take MATH 099 Students can take courses identified as addressing the "quantitative problem solving" GenEd outcome as long as those courses have no prerequisites (e.g., QUANT 113, QUANT 131, CSCI 281)
18 ≤ ACT Math ≤ 22: Students can take GenEd course	22 ≤ ACT Math ≤ 27:	Students can take MATH 099 - 171, 210 Students can take courses identified as addressing the "quantitative problem solving" GenEd outcome (including those that list MATH 099 as a prerequisite)
ACT Math ≥ 23: Math reasoning requirement met	ACT Math ≥ 28:	GenEd (quantitative problem solving) outcome met Students can take MATH 191, 210 Students can take STAT 213

Impact: This will increase placement standards to align with ACT recommendations and the standards from other institutions to ensure students are prepared for college-level math courses. With these changes, fewer students will be placed into college-level math courses, fewer students will be placed directly into MATH 191, MATH 210, and STAT 213; and more students will be required to take a course addressing the "quantitative problem solving" General Education outcome.

While placement standards will increase, this change will not require students to take additional math classes in order to fulfill institutional requirements. Regardless of placement, all students will have the opportunity to fulfill the General Education outcome through a single course. For example, an English major with an ACT Math score of 16 is currently required to complete 6-credits in mathematics (MATH 095 and MATH 131, typically). Under these proposed changes, that English major would be able to complete institutional requirements in 3-credits (taking either QUANT 113, QUANT 131, CSCI 281, or any other General Education quantitative problem solving course with no prerequisites).

The only students who will be required to complete MATH 099 will be students with ACT scores of 21 or lower who major in programs that require a 100-level MATH course (e.g., natural science, social science, engineering majors). For these students, it is imperative that they have the mathematical skills to handle a college-level math course. In our college-level math courses, this will increase student achievement by increasing expectations for students and reducing student frustration, anxiety, and embarrassment.

With these proposed changes, students with ACT scores between 23-27 will no longer be considered to have met institutional requirements (and will no longer be able to directly enroll in MATH 191 or STAT 213). This will ensure only those students who have demonstrated proficiency in quantitative problem solving will graduate from SAU. We will no longer accept average high school mathematics achievement as meeting our institutional standards.

Based on 2009 ACT scores, these proposed changes would identify 184 additional incoming freshmen who are not prepared for college-level math courses. These proposed changes would also require an additional 129 incoming students to complete a General Education quantitative problem solving course (those with ACT Math scores between 23-27). By eliminating the institutional mathematics reasoning requirement (and allowing students more options to fulfill institutional requirements), we do not anticipate a large increase in enrollments in our math courses.

The table on the next page displays how the proposed changes would have impacted our 2009 incoming freshmen:

Placement	Developmental	General Education Math	All Math Requirements Met
Current Standards	125 students (23%) must take MATH 095 and another MATH/STAT course (6 credits total)	221 students (41%) can fulfill requirements with a 3-credit course	194 students (36%) have met requirements
Proposed Standards	309 students (57%) can fulfill requirements with a 3-credit course (those majoring in programs requiring MATH courses will need to complete MATH 099)	166 students (31%) can fulfill requirements with a 3-credit course	65 students (12%) have met requirements
Difference	*+184 students*	*–55 students*	*-129 students*

Percentages represent percentage of incoming class placed in each category

Students transferring to SAU with an Associate's Degree are assumed to have fulfilled our current mathematical reasoning requirement. We propose transfer students with Associate's Degrees should similarly be assumed to have fulfilled the General Education quantitative problem solving outcome. Thus, the proposed placement changes will not impact these students.

Students transferring to SAU without an Associate's Degree may be impacted by these proposed changes. If these transfer students have not completed any college-level math or quantitative problem solving courses, they will be placed according to our proposed placement standards. If they are transferring in a course equivalent to our math or quantitative problem solving courses, they will have met institutional requirements. We will work with the Registrar's Office to identify course equivalencies. Because we will now allow quantitative problem solving courses to fulfill our institutional requirement, we anticipate fewer transfer students will need to take SAU courses to fulfill institutional requirements.

Because students enrolling in ACCEL classes may not have readily available, recent ACT Math scores, the ACCEL program administers the COMPASS exam to place students in appropriate courses. The COMPASS exam, developed by ACT, recommends placement standards equivalent to the proposed ACT Math standards for main campus students. We recommend ACCEL continue to use the COMPASS for placement and we will work with ACCEL to monitor and evaluate COMPASS cut-scores for placement. This proposal will have no impact on ACCEL students.

Rationale: The Catalog states that students can demonstrate proficiency in mathematical reasoning "through high school coursework and math ACT scores as approved by the Math Department." The Math Department does not approve of the current standards. Also, since we're proposing to eliminate the mathematical reasoning requirement, these placement standards are no longer appropriate.

The figure on the next page summarizes our current placement standards and compares it to the standards of 26 other institutions, ranging from community colleges to private and public universities. The 26 comparison institutions were the only other institutions found to use ACT Math scores for placement (without a separate placement test).

As the figure shows, compared to other institutions using ACT Math scores for placement, we have, by far, the lowest standards. These low standards have an impact on all students -- those with low, average, and high mathematical aptitude.

Our current standards allow students with ACT Math scores between 18-21 to take college-level math courses. According to ACT (and supported by aligning course outcomes with assessment specifications), a score of 22 is the minimum score indicating readiness for entry-level college coursework. Under our current standards, approximately one-third of our incoming freshmen are being inappropriately placed into our college-level math courses.

2009 ACT Math Scores for incoming freshmen

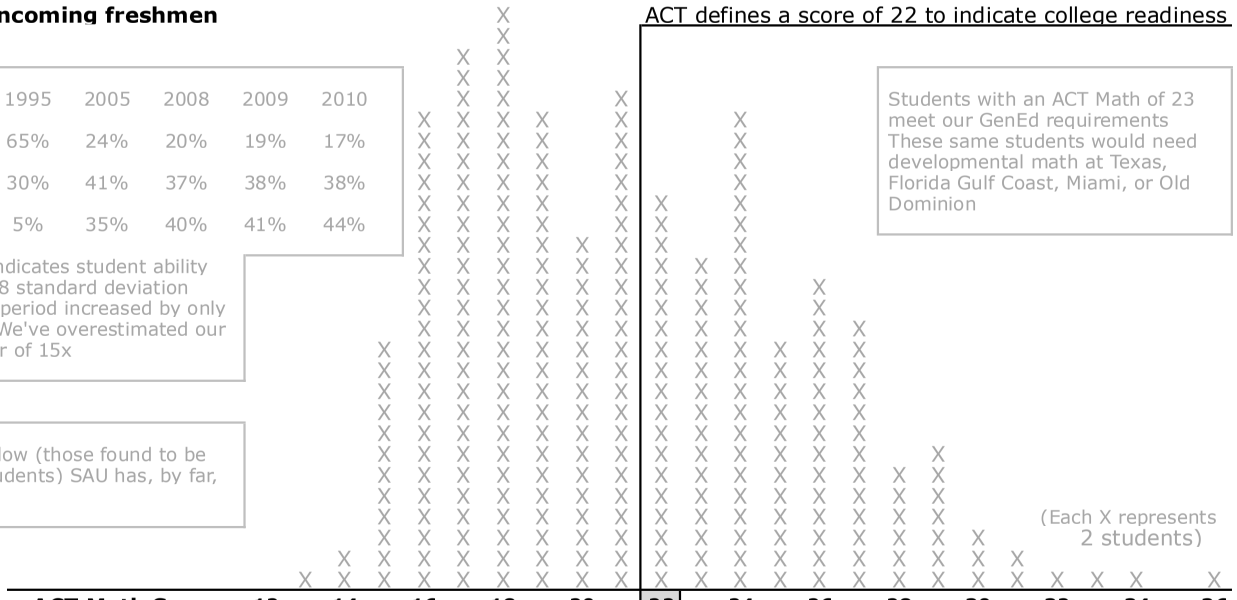
ACT defines a score of 22 to indicate college readiness

SAU Placement:	1986	1991	1995	2005	2008	2009	2010
Developmental	84%	70%	65%	24%	20%	19%	17%
General Education			30%	41%	37%	38%	38%
Requirements met			5%	35%	40%	41%	44%

From 2005-2010, our placement indicates student ability increased by an effect size of 0.258 standard deviation units. ACT scores over that same period increased by only 0.0165 standard deviation units. We've overestimated our students' math aptitude by a factor of 15x

Out of the 26 institutions listed below (those found to be using ACT Math scores to place students) SAU has, by far, the lowest placement standards.

Students with an ACT Math of 23 meet our GenEd requirements These same students would need developmental math at Texas, Florida Gulf Coast, Miami, or Old Dominion



ACT Math Scores:	12		14		16		18		20		22		24		26		28		30		32		34		36
SAU CURRENT PLACEMENT POLICY	**D**	**D**	**D**	**D**	**D**							**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**
Western State College of Colorado	D	D	D	D	D	D											M	M	M	M	M	M	M	M	M
Volunteer State	D	D	D	D	D	D																			
Tennessee Tech	D	D	D	D	D	D																			
Dakota State	D	D	D	D	D	D	D								M	M	M	M	M	M	M	M	M	M	M
Central Washington, Cameron University	D	D	D	D	D	D	D																		
Iowa State	D	D	D	D	D	D	D	D	D						M	M	M	M	M	M	M	M	M	M	M
NE Illinois, Wayne State	D	D	D	D	D	D	D	D	D							M	M	M	M	M	M	M	M	M	M
Fashion InstTech, N Orleans, Elgin CC, UT Knoxville	D	D	D	D	D	D	D	D	D								M	M	M	M	M	M	M	M	M
Washington State	D	D	D	D	D	D	D	D	D										M	M	M	M	M	M	M
Western Connecticut, Missouri Southern State	D	D	D	D	D	D	D	D	D																
U of San Diego	D	D	D	D	D	D	D	D	D	D						M	M	M	M	M	M	M	M	M	M
St. Cloud State, Seattle Univ.	D	D	D	D	D	D	D	D	D	D							M	M	M	M	M	M	M	M	M
Humboldt State	D	D	D	D	D	D	D	D	D	D															
Saginaw Valley State	D	D	D	D	D	D	D	D	D	D								M	M	M	M	M	M	M	M
Texas, Florida Gulf Coast, Miami	D	D	D	D	D	D	D	D	D	D	D														
Old Dominion	D	D	D	D	D	D	D	D	D	D	D								M	M	M	M	M	M	M
SAU PROPOSED PLACEMENT POLICY	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**								**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**

D = Placed into Developmental Math = Placed into General Education M = Met math requirements

The large number of unprepared students has had a noticeable impact on our courses. The breadth and depth of content covered in our 100-level courses have declined in recent years. Likewise, instructor expectations for students in these courses have declined. We have even experienced behavior problems from students who have been inappropriately placed and who do not have the mathematical skills needed to succeed in the course.

Our low placement standards also negatively impact students with more mathematical ability. In fact, our placement standards encourage some of our most mathematically talented students to avoid taking college-level mathematics courses. Our current standard allows more than one-third of our incoming students to graduate without taking a single course in mathematics or quantitative problem solving.

One problem with this standard is that the ACT Math subtest does not measure college-level mathematical or quantitative competency. According to the ACT website, "The questions on the ACT are directly related to what students have learned in **high school courses** in... mathematics."

This year, the national average ACT Math score was 21.0 with a standard error of measurement of 2.0 points. Thus, a student earning a score of 23 is within one standard error of the average. Stated another way, our current placement policy states that students earning an average score (within one standard error) on a **high school math exam** have met our institutional expectations and requirements. Having met our requirements, these students, along with those possessing even higher levels of mathematical aptitude, may never take a college-level mathematics course and may never even consider majoring in a STEM field.

Our placement standards are low and have been declining. Over the past five years, we have consistently placed fewer students into developmental math and a greater number of students into the category that does not require any college-level math courses. In fact, the results of our placement strategy indicates student achievement has increased by 0.26 standard deviations since 2005. The actual ACT Math scores of our incoming students have only increased by 0.017 standard deviation units. Thus, our placement standards have overestimated increases in our students mathematical abilities by a factor of 15.

As the figure on the previous page shows, we could not find a single institution (other than SAU) that allows students with ACT Math scores of 18 to enroll in college-level math courses. Most institutions require an ACT Math score of 22 or 23 (agreeing with the college readiness standard defined by ACT).

Likewise, we could not find another institution that considers students with ACT Math scores of 23, 24, or 25 to have met their institutional mathematics requirements. Worse yet, students who have met our requirements (ACT Math score of 23) would not even be allowed to enroll in a college-level course at the University of Texas, the University of Miami, Florida Gulf Coast, or Old Dominion.

Setting the Standard: The proposed placement standards were selected to align with ACT recommendations, the practices of the Iowa Regent Universities, and the outcomes expected from students in local universities. The proposed placement standards will ensure students are prepared for college-level math courses.

In setting these ACT Math score placement standards, the Math Department used resources such as the *ACT College Readiness Standards*, the *Iowa High School-to-Regent University Transition Guide,* and student learning outcomes we could find online from entry-college-level mathematics courses offered at other universities. We compared these resources to develop a list of knowledge, skills, and abilities that would indicate:

(a) a student is ready to take a course that will address our institutional quantitative problem solving outcome (QUANT 113, 131, or any other approved course)

(b) a student is ready to take MATH 151, 152, 171, or 210

(c) a student has demonstrated the ability to use quantitative information to solve problems and is ready for a more sophisticated course such as MATH 191 or STAT 213

The following page lists the outcomes recommended by ACT.

ACT Math Standards (for students scoring 21 or below on the ACT Math subtest)
==========
Basic Operations and Applications:
1. Perform one-operation computation with whole numbers and decimals
2. Solve problems in one or two steps using whole numbers
3. Perform common conversions (e.g., inches to feet or hours to minutes)
4. Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent
5. Solve some routine two-step arithmetic problems
6. Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and computing with a given average

Numbers: Concepts and Properties:
1. Recognize equivalent fractions and fractions in lowest terms
2. Recognize one-digit factors of a number
3. Identify a digit's place value
4. Exhibit knowledge of elementary number concepts including rounding, the ordering of decimals, pattern identification, absolute value, primes, and greatest common factor
5. Work with squares and square roots of numbers
6. Work problems involving positive integer exponents

Expressions, Equations, and Inequalities:
1. Exhibit knowledge of basic expressions (e.g., identify an expression for a total as b + g)
2. Solve equations in the formx + a = b, where aand b are whole numbers or decimals
3. Substitute whole numbers for unknown quantities to evaluate expressions
4. Solve one-step equations having integer or decimal answers
5. Combine like terms (e.g., 2x + 5x)
6. Evaluate algebraic expressions by substituting integers for unknown quantities
7. Add and subtract simple algebraic expressions
8. Solve routine first-degree equations
9. Perform straightforward word-to-symbol translations
10. Multiply two binomials
11. Identify solutions to simple quadratic equations
12. Add, subtract, and multiply polynomials
13. Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)

Graphical Representations:
1. Identify the location of a point with a positive coordinate on the number line
2. Locate points on the number line and in the first quadrant
3. Locate points in the coordinate plane
4. Comprehend the concept of length on the number line
5. Exhibit knowledge of slope
6. Determine the slope of a line from points or equations

Functions:
1. Evaluate quadratic functions, expressed in function notation, at integer values.

Notes:

According to our placement standards, students demonstrating these skills (either by earning an ACT Math score of 22 or above or by completing MATH 099) are ready to take MATH 151, 152, 171, or 210.

Support: The Department fully supports this proposal.
Statement from Maureen Baldwin (program review, p. 20)
Statement from STAT 213 Group (program review, p. 20)
Statement from ACCEL (program review, p. 20)

Replace MATH 091, 095, 096, and 101 with MATH 099

Proposal: Create the online course -- MATH 099: Developmental Mathematics
Eliminate MATH 095: Intermediate Algebra
Eliminate MATH 091: Fundamentals of Math Workshop (offered only through ACCEL)
Eliminate MATH 096: Intermediate Algebra Workshop (offered only through ACCEL)
Eliminate MATH 101: Orientation to College Math (offered only through ACCEL)

Impact: Students will be better prepared for college-level math courses by completing an individualized online course that provides immediate feedback and extra practice in focused mathematical skills. We anticipate being able to serve a larger number of students while reducing our staffing costs.

ACCEL will no longer offer 3 developmental math courses (0-credit MATH 091, 0-credit MATH 096, 1-credit MATH 101). Instead, ACCEL will offer a single MATH 099 course (possibly staffed by a single Developmental Math Coordinator hired by the Math Department). The course will focus on outcomes rather than contact hours and credit hours.

Likewise, the main campus will no longer offer the traditional MATH 095 course. Instead, we will offer the online-supplemented course, MATH 099, which will focus on outcomes rather than contact hours and credit hours.

This proposal could require additional computer lab space or availability.

Students transferring to SAU with an Associate's Degree will not be impacted by this proposal. Students transferring without an Associate's Degree may need to take MATH 099 instead of MATH 095.

Rationale: Our current developmental math courses do not meet the needs of our students.

As recent as 6 years ago, we offered MATH 090: Fundamentals of Math (0-credits) for students who needed remediation before enrolling in our developmental course. We stopped offering this course due to low enrollment (which, in turn, was due to our low placement standards). While we still have students who need this level of remediation (help with basic arithmetic and elementary algebra), their numbers do not justify offering MATH 090 regularly.

On the main campus, we offer a single MATH 095 course to meet the needs of all students who are underprepared for college-level math courses. This means we have a wide range of student ability in the course. Some students in MATH 095 cannot perform basic arithmetic, while others simply need a quick review of specific algebra skills. With a single course with a set syllabus, schedules, and exams, it has proven to be extremely difficult to manage a course with such wide variation in student ability. Our traditional MATH 095 course does not adequately serve our student population.

In 2006, EPC approved our proposal to offer an alternative sequence of developmental math courses at ACCEL. Rather than placing all students into a single course, students were placed into 1-hour courses designed to address the varying mathematical abilities of students. Students needing the least remediation would take a 1-credit MATH 101 course to prepare them for college-level math courses. Students needing slightly more remediation enrolled in a 0-credit, 1-hour MATH 096 course prior to MATH 101. Students needing the most extensive remediation enrolled in a 0-credit, 1-hour MATH 091 course prior to enrolling in MATH 096. While the 091-096-101 sequence has allowed us to tailor instruction slightly more towards individual student abilities, it still hasn't proven to be successful. We need a course that allows for more individualization.

Another problem with our traditional MATH 091, 095, 096, and 101 courses is that they are, in a word, traditional. Students in these courses have typically encountered the same content, taught in the same manner, several times during high school. These students have taken traditional, face-to-face courses in high school algebra (e.g., Algebra A, Algebra B, Algebra 1, Introduction to Algebra) and have not succeeded. It is

difficult to motivate students when they feel our course is the same course they've (unsuccessfully, and maybe repeatedly) taken in high school. It's also unrealistic to assume a traditional, 45-contact hour course in a single semester can prepare students for college-level math when years of high school courses (with much more contact time) were unable to do so. We believe an online-supplemented or online-only MATH 099 course can offer improved, individualized instruction and cost-savings for students and the institution.

In 2009, we began piloting online course management and homework systems for MATH 095. While MATH 095 is still taught in a traditional, face-to-face manner, the online homework system has improved our ability to differentiate instruction based on student ability. The online homework system (MathXL) allowed instructors to closely monitor student progress while saving the instructor time in developing and grading simple algebraic problems. The system also allowed students to progress at a slightly more individualized pace, although the course as a whole continued to progress according to the schedule in the course syllabus.

Last year, we piloted an online assessment and learning system (ALEKS) in two sections of MATH 095. This system further individualized instruction by using adaptive questioning to determine student achievement and instruct students on topics they were most ready to learn. The system periodically reassessed students to measure retention of course outcomes. It also allowed students access to (virtual) one-on-one instruction at any time.

During our pilot of the ALEKS system, students in the traditional MATH 095 course paid $117 (used) or $156 (new) for the textbook. Students in the computerized, online learning system course paid $67-$89 for a code to access ALEKS. So in addition to receiving individualized instruction and immediate feedback, students in the ALEKS section saved $50-$67 in materials costs.

Credits from MATH 091, 095, and 096 do not count towards the 120-hour degree requirement. We propose MATH 099 similarly as a 0-credit course that focuses on outcomes rather than credit hours. Students who need MATH 099 (those with ACT Math scores of 21 or lower majoring in programs that require 100-level math courses) would register for MATH 099 just as they would register for any other course.

Instead of assigning 3-4 instructors to teach traditional sections of MATH 095, we propose having a single Developmental Math Facilitator who would be responsible for managing MATH 099. This Facilitator would be responsible for developing/maintaining the syllabus, coordinating any face-to-face and tutoring sessions, monitoring the online instructional system, developing course procedures and requirements, and assessing/ grading students

Students would meet MATH 099 learning outcomes primarily through online resources. With his experience in developing other online courses at SAU, Dr. Jim Van Speybroeck assisted the Department in its efforts to research, evaluate, and select the best online solution for MATH 099. After the Math Department identified the content and skills required for success in 100-level math courses, Dr. Van Speybroeck contacted publishers to identify potential solutions. He also began working to develop a customized ourse textbook, investigate online resources from the textbook publisher, and collaborate with our IT Department to integrate the course materials into Blackboard. We are currently working through the university's new distance learning policy.

Students enrolled in MATH 099 will meet face-to-face with the Coordinator during the first week of classes to learn course expectations and how to use the online system. Students will then work through the interactive, adaptive online resources to learn the course content and demonstrate their mastery of course outcomes. In addition to being able to take advantage of peer tutoring at the Student Success Center, students will also be able to meet weekly with course support students. These course support students will be Math Education majors enrolled in our MATH 399: Postsecondary Clinical Teaching Experience course (see explanation on page 43).

In the future, we may offer MATH 099 continuously (rather than on a semester-by-semester basis) so that students can complete the learning objectives at any time, including the summer before their first fall semester of enrollment. We are also actively investigating the possibility of charging a fee for this learning experience (which should increase motivation, save students money, and possibly increase revenues to SAU), rather than charging standard tuition rates for a course.

An online MATH 099 should increase student achievement. Students placed in developmental math courses are, typically, hesitant to ask and answer questions in class out of a fear of embarrassment. An online course allows these students to practice skills in a safe, private environment. This online course, with the availability of face-to-face meetings and peer tutoring, should also give students more options to seek assistance. Finally, because a Developmental Math Coordinator can precisely set course outcomes and standards, we will be able to ensure students completing MATH 099 are prepared for college-level math courses.

The final rationale for replacing MATH 091, 095, 096, and 101 with MATH 099 is that it will reduce staffing costs. Combining the main campus and ACCEL, we currently offer 15-16 sections of these courses each year (totaling 30 credit hours). This is equivalent to a full-time position and 6 adjunct credits. Regardless of the impact of the proposed changes to the placement standards, we will be able to cover all these sections with a single Developmental Math Coordinator.

Support: Statement from Maureen Baldwin (program review, p. 20)
Statement from ACCEL (program review, p. 20)

Create QUANT 113: Applied Probability

Proposal: Create QUANT 113: Applied Probability, a course designed to address the quantitative problem solving General Education outcome.

Impact: We will offer this course each semester in response to student demand. Since this course has no prerequisites, students with ACT Math scores of 21 or lower may enroll in this course to fulfill institutional requirements in 3-credits. With its focus on probability and randomization methods, this course would serve to better prepare students for STAT 213. This course could also serve to attract students to STEM fields or a potential minor in statistics.

Rationale: Student interest in probability and statistics is growing. According to the Conference Board of Mathematical Sciences, undergraduate statistics enrollments grew from 27% of the size of calculus enrollments in 1970 to 74% of the size of calculus enrollments in 2000 (GAISE, 2010). The College Board reports that 7,500 students took the AP Exam in statistics when it was first offered in 1997. By 2009, more than 116,000 students took the AP Exam (College Board, 2010).

While we have upper-level major-specific statistics courses in the social sciences, engineering, criminal justice, and mathematics, and STAT 213, which is a more general statistics *methods* course, we do not offer students a prerequisite-free, General Education applied probability course. This course would fill this gap.

Rather than competing with existing statistics courses, this course would complement and support those courses. Since this course focuses on probability, simulation, and randomization -- and does not cover any statistical methods taught in our existing statistics courses, such as descriptive statistics, t-tests, ANOVA, and linear regression -- students could take this course prior to or following any existing statistics course. If taken before a statistics course, QUANT 113 would prepare students to learn specific statistical methods by providing them general concepts of statistical inference via a study of probability. If students take QUANT 113 following a statistics course, they would learn additional methods to analyze data and would be able to evaluate the appropriateness and usefulness of traditional parametric statistical methods. If a student takes this course and never takes a statistics course, the student will still gain an appreciation for the applicability of mathematics to modern problems.

In using hands-on and computer-based simulations to learn and apply probability, this course will not be mathematically sophisticated and, therefore, will not require a prerequisite course.

The course outcomes, as shown in the Course Summary Sheet, primarily align with two General Education outcomes: (8) Use quantitative information to solve problems, and (16) Evaluate the validity of arguments, sources, analysis methods, and conclusions. In applying probability and simulation methods to model systems, students will be solving problems through the use of quantitative information. By evaluating the methods used to draw conclusions, and by drawing conclusions from their methods, students will be addressing GenEd outcome #16.

Materials for this course will be adapted from the NSF-TUES (Transforming Undergraduate Education in Science, Technology, Engineering, and Mathematics) funded program entitled, "Developing an innovative randomization-based introductory probability and statistics curriculum." The Principal Investigators on this program are Nathan Tintle (Dordt College), Alan Rossman and Beth Chance (CalPoly), Soma Roy (Ohio State), and Todd Swanson (Hope College). Dr. Brad Thiessen serves as an advisor for this program.

Support: We met with the STAT 213 group on October 5 to discuss this course's relationship with STAT 213.

Sources: GAISE College Report (2010). Guidelines for Assessment and Instruction in Statistics Education. Accessed 8/31/2010 from site: http://www.amstat.org/education/gaise/

Change MATH 131: Math for Liberal Arts to QUANT 131: Thinking Mathematically

Proposal: Change MATH 131: Math for Liberal Arts to QUANT 131: Thinking Mathematically and remove all prerequisites.

Impact: We will need to monitor student demand for this course. It should remain a popular option for students to meet institutional requirements.

Rationale: The name and prefix change will better reflect intended course outcomes. Removing prerequisites will allow more students to enroll in this course and meet institutional requirements through a single 3-credit course.

Support: The Department fully supports this proposal.

Eliminate MATH 151 by Fall 2013

Proposal: Eliminate MATH 151: College Algebra before the Fall 2013 semester.

Impact: This should increase enrollments in our MATH 171: Elementary Functions course.

Departments and programs currently listing MATH 151 as a requirement (or prerequisite) will have two years to identify a replacement course. The obvious choice would be MATH 171, which combines student learning outcomes from MATH 151 and MATH 152 in a more logical framework. We will also continue to encourage programs to identify student learning outcomes they desire from a math course and propose any new courses they need. See page 30 for a list of courses we would recommend for each major.

Rationale: MATH 151 does not address the quantitative problem solving General Education student learning outcome. At many universities in Iowa and Illinois, College Algebra is no longer recognized as a General Education-level course. The following excerpt from the minutes of the Instructional Council meeting of the Eastern Iowa Community College District demonstrates this:

> "[The Associate Director of Curriculum & Program Support for the Eastern Iowa Community College District] noted that the CDM proposes MAT:121 College Algebra be removed from the math general education category because none of the Iowa Regent Universities recognize this course as fulfilling a math general education requirement. ... The University of Iowa considers [College Algebra] to be below college level and actually deducts 4 credits from the associate's degree earned by the student."
> http://prod.campuscruiser.com/PageServlet?pg=offices_welcome&tg=OfficeWelcome&cx=22.215-51.2518

In place of College Algebra, the Iowa Regent Universities allow the following courses to fulfill math- and quantitative-related General Education requirements:

University of Iowa	Iowa State	Northern Iowa
Principles of Computing, 3 s.h.	Introduction to Probability and Matrices	Mathematics in Decision Making (3 hrs.)
Introduction to Computer Science	Introduction to Mathematical Ideas	Mathematical Reasoning for Teaching (3 hrs.)
Computer Science I: Fundamentals, 4 s.h.	Discrete Math for Business & Social Sciences	Precalculus (4 hrs.)
Logic of Arithmetic	Calculus for Business and Social Sciences	Calculus I (4 hrs.)
Elementary Functions, 4 s.h.	Survey of Calculus	Introductory Statistics for Life Sciences (3 hrs.)
Finite Mathematics, 4 s.h.	Calculus I	Introduction to Statistical Methods (3 hrs.)
Theory of Arithmetic	Calculus II	Computational Modeling/Simulation, (3 hrs.)
Mathematics for Business, 4 s.h.	Calculus & Math Modeling for Life Sciences I.	Theory of Arithmetic (3 hrs.)
Mathematics for the Biological Sciences, 4 s.h.	Calculus & Math Modeling for Life Sciences II.	
Calculus for the Biological Sciences, 4 s.h.	Introduction to Proofs	***Students with Math ACT scores that are 26 or
Calculus & Matrix Algebra for Business, 4 s.h.	Calculus III	higher will be placed in Calculus I or Introduction
Calculus I, 4 s.h.	Elementary Differential Equations	to Statistical Methods as follows:
Engineering Math I: Single Var Calculus, 4 s.h.	Elementary Differential Equations and Laplace	
Statistics and Society	Transforms	Those with four years of college prep math with a
Statistics for Business, 4 s.h.		grade of B or higher in the senior-level course will
Elementary Statistics and Inference		be placed in Calculus I. Those not satisfying
Statistical Methods and Computing		these criteria will be placed in Introduction to
Principles of Reasoning		Statistical Methods.
Scientific Reasoning		
Theory and Practice of Argument, 4 s.h.		
Language and Formal Reasoning		
Honors Seminar: Quantitative & Formal Reasoning		

The proposals in this document, especially the elimination of the institutional mathematical reasoning requirement, the elimination of MATH 151, the renaming of QUANT 131, and the creation of QUANT 113, will result in options that will more closely mirror those of the Iowa Regent Universities.

Support: Statement from GenEd Director (program review, p. 20)

Eliminate MATH 161

Proposal: Eliminate MATH 161: Math for Business/Economics

Impact: Enrollment in MATH 171: Elementary Functions should increase slightly.

Rationale: The College of Business agrees with eliminating this course due to low enrollment and student feedback. The course became too specialized.

From Spring 2010 to Summer 2011, only 60 students enrolled in 5 sections of MATH 161. If we had more seats available in our other courses, we expect that even fewer students would have enrolled in this course. With no majors requiring MATH 161, students opted to enroll in lower-numbered courses.

We also received feedback from students that the course content was too difficult and too specialized. While many other universities require business calculus or business math for business majors, we do not have an audience for this course.

We will continue to work with the College of Business as they identify student learning outcomes they desire from a math course. In the meantime, students can enroll in MATH 151 or MATH 171.

Support: Statement from College of Business (program review, p. 20)
Statement from ACCEL (program review, p. 20)

Impact of proposals on incoming students and mathematics course enrollments

The proposed changes to our placement standards and the elimination of our institutional mathematical reasoning requirement will impact our incoming students. On one hand, with the increased placement standards, many incoming students may be required to complete additional math courses. On the other hand, with the elimination of the institutional mathematical reasoning requirement and the creation of prerequisite-free quantitative reasoning courses, many students may actually be required to complete fewer credits in mathematics.

To estimate the impact of these proposed changes on incoming students, we analyzed data from the 2008 incoming freshmen class. This data included ACT Math scores, declared academic programs, and academic recruitment purposes (identifying students who were intending to go into physical therapy, occupational therapy, engineering, nursing, medicine) of 550 incoming freshmen.

Of these 550 students, 40 (7%) had no academic programs identified and no academic recruitment purpose. We could not determine the math courses required for these students. We were able to determine the required math courses for the other 510 (93%) students who had identified academic programs or recruitment purposes.

So our final data set consisted of the following information for each of the 510 incoming freshmen:

(a) Intended academic programs and/or academic recruitment purpose

(b) ACT Math score

(c) The number of mathematics credits currently required for each student's academic program (includes MATH 095, 131, 151, 152, 161, 171, 191, 210; STAT 213; STBE 337; CRJU 330)

(d) The number of mathematics or quantitative problem solving credits required for each student if the proposals set forth in this document are approved (includes MATH 099, 152, 171, 191, 210; QUANT 113, 131; Any other 3-credit quantitative problem solving course; STAT 213; STBE 337; CRJU 330).

With this data, we could estimate the impact of our proposed changes on each student. In doing this, we made the following assumptions:

(a) Students would take the most efficient path to complete their math requirements (taking the fewest credits possible to meet requirements)

(b) Students would pass all math courses on the first attempt

(c) QUANT 113 would be allowed to serve as a prerequisite for STAT 213 (in addition to allowing MATH 171 to serve as a prerequisite)

(d) Majors would maintain their current requirements or, in the case of MATH 151 being eliminated, would substitute another 3-credit MATH course (possibly as recommended on page 30)

Results: The table on the next page summarizes the results of this analysis organized by ACT Math scores. The middle column shows the impact of the proposed increase in placement standards on incoming freshmen. As the table shows, students with ACT Math scores of 17 or below, 22, or 28 or above will not be affected. All other students (59% of the incoming class) would be required to complete one additional math course to meet institutional requirements. To meet these increased requirements, the institution would have to offer 13 additional sections of mathematics courses each year (assuming an average class size of 23 students).

If we were to **only** change placement standards to align with ACT recommendations, we would need to hire a full-time faculty line to teach the additional courses. Keep in mind, this is assuming we have an incoming class of only 510 students.

The column on the right shows the effect of all our proposed changes (increasing placement standards, eliminating the mathematical reasoning requirement, and creating prerequisite-free quantitative problem solving courses). Under these proposals, 33% of students would be required to take one additional course, 51% would not be impacted, and 15% would see a 3-semester hour reduction in required math credits. **Thus, all our proposals would have a net effect of requiring 3 additional course sections per year.** These 3 sections could be offered by the Math Department or any other department with an approved course.

	Impact of increased placement standards	Impact of increased placement standards, elimination of mathematical reasoning requirement, and creation of QUANT 113, 131
ACT Math ≤ 17 (or no ACT Math recorded)	135 students 0 require additional math (+0 student credit hours; +0 course sections) 135 experience no change in requirements 0 require fewer math credits (-0 student credit hours; -0 course sections)	135 students 0 require additional math (+0 student credit hours; +0 course sections) 58 experience no change in requirements 77 require fewer math credits (-231 student credit hours; -3.3 course sections)
18 ≤ ACT Math ≤ 21	161 students 161 require additional math (+483 student credit hours; +7 course sections) 0 experience no change in requirements 0 require fewer math credits (-0 student credit hours; -0 course sections)	161 students 72 require additional math (+216 student credit hours; +9 course sections) 89 experience no change in requirements 0 require fewer math credits (-0 student credit hours; -0 course sections)
ACT Math = 22	34 students 34 experience no change in requirements	34 students 34 experience no change in requirements
ACT Math = 23	28 students 28 require additional math (-84 student credit hours; +1 course section) 0 experience no change in requirements	28 students 20 require additional math (+60 student credit hours; +1 course section) 8 experience no change in requirements
24 ≤ ACT Math ≤ 27	112 students 112 require additional math (+336 student credit hours; +5 course sections) 0 experience no change in requirements 0 require fewer math credits (-0 student credit hours; -0 course sections)	112 students 79 require additional math (+237 student credit hours; +3.3 course sections) 33 experience no change in requirements 0 require fewer math credits (-0 student credit hours; -0 course sections)
ACT Math ≥ 28	40 students 40 experience no change in requirements	40 students 40 experience no change in requirements
All students	510 students 301 require additional math (+903 student credit hours; +13 course sections) 207 experience no change in requirements 0 require fewer math credits (-0 student credit hours; -0 course sections)	510 students 171 require additional math (+513 student credit hours; +7.3 course sections) 262 experience no change in requirements 77 require fewer math credits (-231 student credit hours; -3.3 course sections)
Net change	+903 student credit hours + 13 course sections (with 23 students per section)	+282 student credit hours + 3 course sections (with 23 students per section)

With larger incoming class sizes, or with a different profile of ACT scores, these results may change. Likewise, these proposed changes may impact the academic programs selected by students or the students who choose to apply to SAU. For example:

(a) Suppose a high school graduate with an ACT Math of 17 and an interest in studying history is choosing a college. This student may be interested in SAU, but could be turned off by the current math requirements (MATH 095 followed by another MATH course). Under these proposals, this student would only need to take a quantitative problem solving course, such as QUANT 113, 131, or CSCI Discrete Structures. This 3-credit hour reduction in institutional requirements may attract this student to SAU.

(b) Suppose we have an incoming freshmen with an ACT Math of 23 who wants to major in Industrial Engineering. Currently, this student would be allowed to take MATH 191. Under these proposals, this student would be required to take MATH 171 prior to MATH 191. This 3-credit increase in credit requirements may encourage the student to consider another major.

We would have to closely monitor the impact of these changes over time.

The table on the previous page shows students within ACT Math ranges that would be impacted by these proposals. It may be interesting to consider the academic programs that may be most affected. Of the 171 students in the 2008 incoming freshmen class who would be required to take 3 additional credit hours in mathematics or quantitative problem solving, the following academic programs were most affected:

- 39 students intending to major in General Business
- 22 students intending to major in Early Childhood or Elementary Education
- 17 students intending to major in Biology
- 11 students intending to major in Accounting
- 11 students intending to major in Marketing
- 8 students intending to major in Industrial Engineering
- 7 students intending to major in Criminal Justice
- 6 students intending to major in Psychology

Of the 77 students in the 2008 incoming freshmen class who would be required to take 3 fewer credit hours in mathematics or quantitative problem solving, the following academic programs were most affected:

- 11 students intending to major in Criminal Justice
- 5 students intending to major in Art
- 4 students intending to major in Radio/TV
- 4 students intending to major in Psychology
- 4 students intending to major in Biology

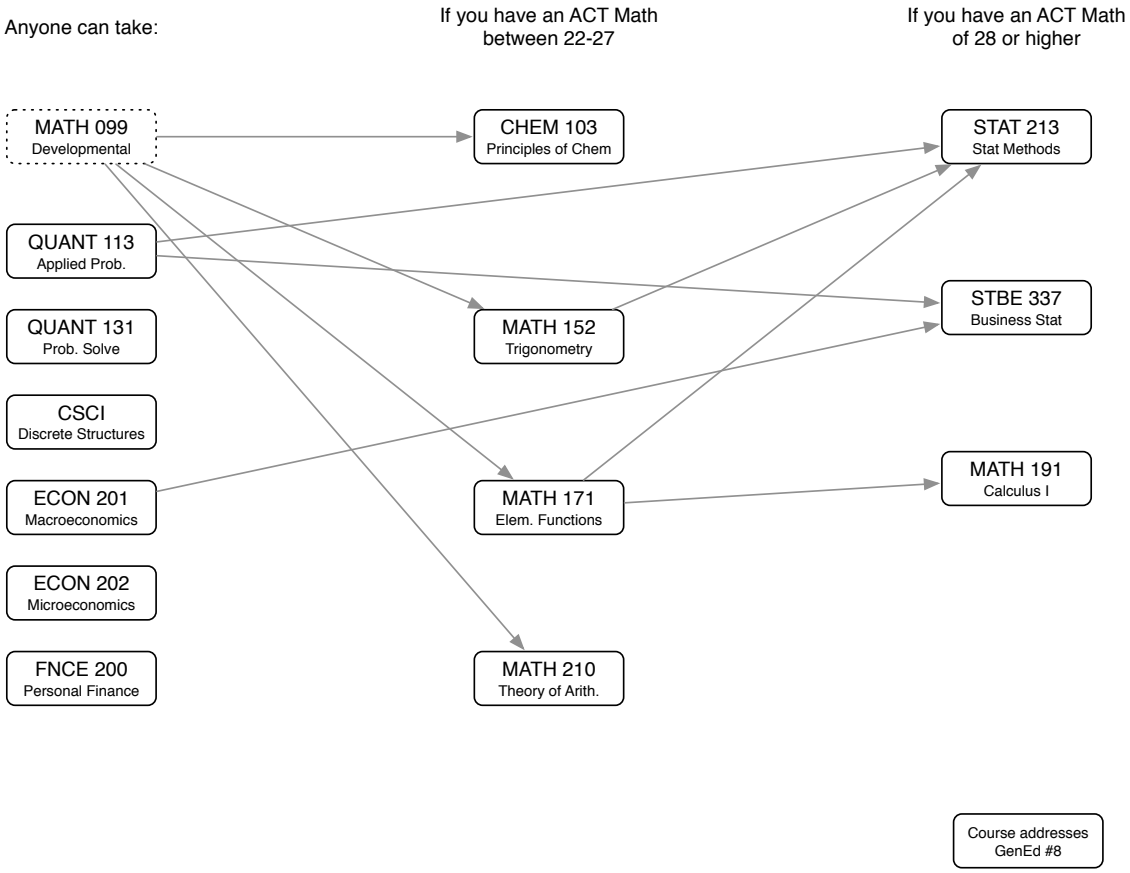
Impact on Transfer Students: The proposed changes will not impact students transferring to SAU with an Associate's degree. The Math Department recommends that we continue to consider students transferring to SAU with an Associate's Degree have already met our mathematical reasoning requirement.

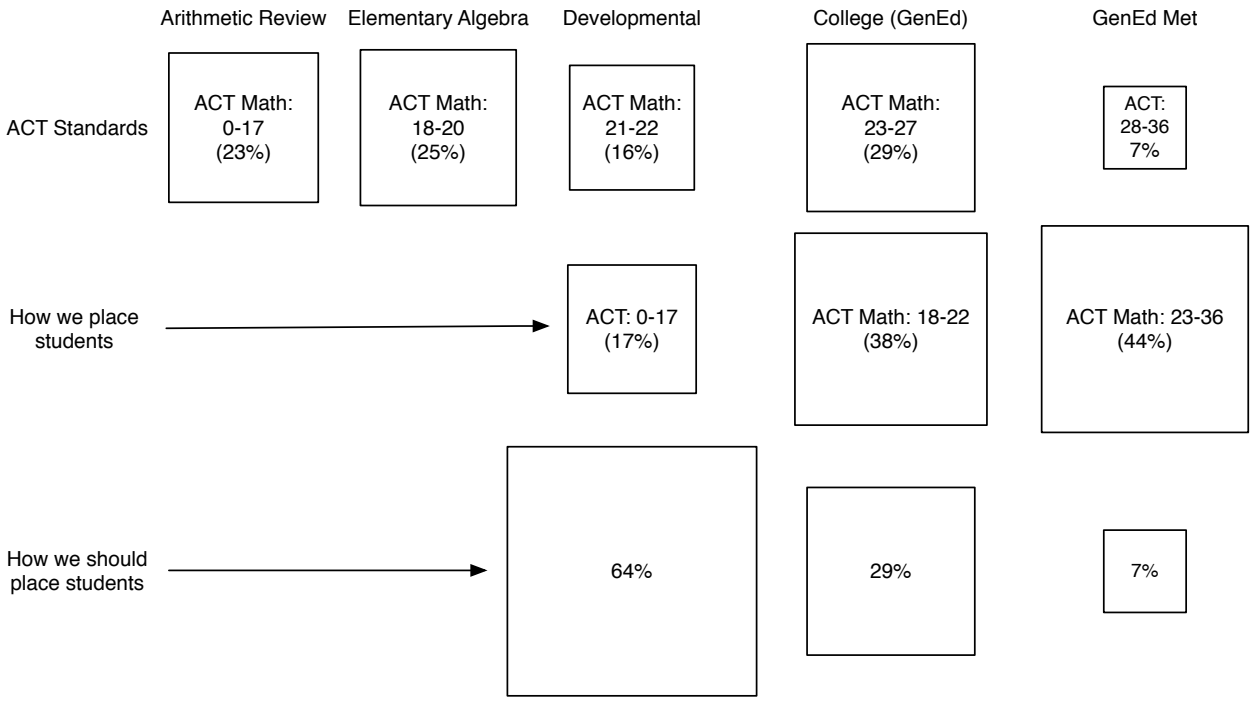
Students transferring without an AA or AS degree may be impacted. If they have not taken any mathematics or quantitative problem solving courses, they will need to complete our institutional requirements (completing a course that addresses the "quantitative problem solving" General Education outcome). If they have taken math/quantitative courses prior to transferring to SAU, we will work with the Registrar's Office to identify the course equivalencies. The following table displays typical courses completed at other institutions and our recommendations for their equivalency with SAU mathematical reasoning courses:

Transfer Type	Course taken prior to SAU transfer	SAU equivalency
Associate's Degree	Any	GenEd "Quantitative" requirement met
No Associate's Degree	Basic, Elementary, Intermediate Algebra	MATH 099
	Concepts, Foundations of Math	MATH 099
	Quantitative Literacy	QUANT 131
	Contemporary Mathematics	QUANT 131
	Mathematical Investigations	QUANT 131
	Math For Liberal Arts; Modern Society	QUANT 131
	General Education Math	QUANT 131
	College Algebra	Math Elective
	Trigonometry	MATH 152
	Geometry	Math Elective
	Precalculus	MATH 171
	Discrete Mathematics	CSCI Discrete Structures
	Finite Mathematics	MATH 171
	Business Mathematics	MATH 171
	Applied, Basic, Elementary, General Statistics	STAT 213
	Introductory Probability, Statistics	QUANT 113
	Math for Elementary School Teachers	MATH 210

Impact on ACCEL Students: Currently, ACCEL offers MATH 091, 095, 096, 101, 131, 151, and 161 as needed. These proposals should simplify ACCEL scheduling.

Current ACCEL courses	ACCEL courses if proposals are approved
MATH 091 MATH 095 MATH 096 MATH 101	MATH 099
MATH 131	QUANT 131
MATH 151 MATH 161	MATH 171 or another course approved by the College of Business


Anyone can take:
If you have an ACT Math between 22-27
If you have an ACT Math of 28 or higher
MATH 099
Developmental
QUANT 113
Applied Prob.
QUANT 131
Prob. Solve
CSCI
Discrete Structures
ECON 201
Macroeconomics
ECON 202
Microeconomics
FNCE 200
Personal Finance
CHEM 103
Principles of Chem
MATH 152
Trigonometry
MATH 171
Elem. Functions
MATH 210
Theory of Arith.
STAT 213
Stat Methods
STBE 337
Business Stat
MATH 191
Calculus I
Course addresses GenEd #8


Arithmetic Review
Elementary Algebra
Developmental
College (GenEd)
GenEd Met
ACT Standards
ACT Math: 0-17 (23%)
ACT Math: 18-20 (25%)
ACT Math: 21-22 (16%)
ACT Math: 23-27 (29%)
ACT: 28-36 7%
How we place students
ACT: 0-17 (17%)
ACT Math: 18-22 (38%)
ACT Math: 23-36 (44%)
How we should place students
64%
29%
7%

Recommended Courses by Major

With the elimination of the institutional mathematics reasoning requirement, elimination of MATH 161, elimination of MATH 151 by Fall 2013, and creation of QUANT 113 and 131, this set of proposals will impact several departments and programs. The overall effect should be to provide the same or more opportunities for students within each major.

Programs that do not require specific math courses for their students will not be impacted. Their students will be given more options for fulfilling institutional requirements by completing a single course (which may or may not be hosted by the Mathematics Department).

Programs that require MATH 171 or higher will also not be impacted by these proposals. We have made no proposals concerning MATH 171, MATH 191, or upper-level courses taken by students in other programs.

The programs that identified MATH 161 as an option to complete program requirements have already given us approval to eliminate the course.

Programs that currently list MATH 151 as a requirement or prerequisite will be impacted. These programs will have until Fall 2013 to identify a course to replace MATH 151. The Mathematics Department recommends MATH 171 as that replacement, since it combines the outcomes of MATH 151 and MATH 152.

We encourage all programs to evaluate the math course(s) they require for their majors. We are more than willing to meet with other programs to help select or create math courses that will better prepare students.

To assist programs in selecting required math courses, the Mathematics Department created the table beginning on the next page. It lists the math and statistics courses required by each major (as listed in the 2011-13 Catalog) along with the courses we would recommend (if our proposals are approved and implemented). The required and recommended courses are listed by student placement (low, medium, or high; based on ACT Math scores).

The far-right column of the table displays students within majors who may actually see a decrease in their math-related credit requirements. For example, we recommend Art majors with low ACT Math scores take a single quantitative problem solving course rather than the current requirements of MATH 095 and another course.

Program/Major	Current Requirement	Recommended Requirement	
Accounting, International Acct.	L: MATH 095, 151/161, STBE 337 M: MATH 151/161, STBE 337 H: STBE 337	L: MATH 099, 171, STBE 337 M: MATH 171, STBE 337 H: STBE 337	
Applied Management Studies	L: Take placement test; MATH 095, 151/161 M: Take placement test; MATH 151/161 H: Take placement test	L: Take placement test; MATH 099, 171 M: Take placement test; MATH 171 H: Take placement test	
Art Majors	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/152/171 or CSCI 281 H:	L: QUANT M: QUANT H:	–
Biology	L: MATH 095, 151/171, STAT 213 M: MATH 151/171; STAT 213 H: STAT 213	L: MATH 099, 171, STAT 213 M: MATH 171; STAT 213 H: STAT 213	
Biomedical Science, Molecular Biology concentrations	L: MATH 095, 171, STAT 213, MATH 191 M: MATH 171; STAT 213, MATH 191 H: STAT 213, MATH 191	L: MATH 099, 171, STAT 213, MATH 191 M: MATH 171; STAT 213, MATH 191 H: STAT 213, MATH 191	
Business Majors	L: MATH 095, 151/161, STBE 337 M: MATH 151/161, STBE 337 H: STBE 337	L: MATH 099, 171, STBE 337 M: MATH 171, STBE 337 H: STBE 337	
Financial Economics concentration	L: MATH 095, 151/161, 152, 191, STBE 337 M: MATH 151/161, 152, 191, STBE 337 H: STBE 337	L: MATH 099, 171, 191, STBE 337 M: MATH 171, 191, STBE 337 H: MATH 191, STBE 337	– –
Business Administration	L: MATH 095, 151/161, STBE 337 M: MATH 151/161, STBE 337 H: STBE 337	L: MATH 099, 171, STBE 337 M: MATH 171, STBE 337 H: STBE 337	
Chemistry	L: MATH 095, 171, 191, 192; (290/291 rec for B.S.) M: MATH 171, 191, 192; (290/291 rec for B.S.) H: MATH 191, 192; (290/291 rec for B.S.)	L: MATH 099, 171, 191, 192; (290/291 rec for B.S.) M: MATH 171, 191, 192; (290/291 rec for B.S.) H: MATH 191, 192; (290/291 rec for B.S.)	
Criminalistics	L: MATH 095, 171, STAT 213 or CRJU 430 M: MATH 171, STAT 213 or CRJU 430 H: STAT 213 or CRJU 430	L: MATH 099, 171, STAT 213 or CRJU 430 M: MATH 171, STAT 213 or CRJU 430 H: STAT 213 or CRJU 430	
Communications majors	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/152/171 or CSCI 281 H:	L: QUANT M: QUANT H:	–
Media Studies major	L: MATH 095, 151/171, STAT 213 M: MATH 151/171; STAT 213 H: STAT 213	L: MATH 099, 171, STAT 213 M: MATH 171; STAT 213 H: STAT 213	
Computer Science	L: MATH 095, 171, 191, 290/300 M: MATH 171, 191, 290/300 H: MATH 191, 290/300	L: MATH 099, 171, 191, 290/300 M: MATH 171, 191, 290/300 H: MATH 191, 290/300	
Computer Investigations & Criminal Justice; Network Administration	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/152/171 or CSCI 281 H:	L: QUANT M: QUANT H:	–
Computer Information Systems	L: MATH 095, 151/161, STBE 333 M: MATH 151/161, STBE 333 H: STBE 333	L: MATH 099, 171, STBE 333 M: MATH 171, STBE 333 H: STBE 333	
Criminal Justice (see Sociology)			
Education - Elementary Endorsement	L: MATH 095, MATH 210 M: MATH 210 H: MATH 210	L: MATH 099, MATH 210 M: MATH 210 H: MATH 210	
K-8 Math endorsement	L: MATH 095, 151/171, 152, 191, 192, 210, 211, 300, 360 M: MATH 151/171, 152, 191, 192, 210, 211, 300, 360 H: MATH 191, 192, 210, 211, 300, 360	L: MATH 099, 171, 191, 192, 210, 211, 300, 360 M: MATH 171, 191, 192, 210, 211, 300, 360 H: MATH 191, 192, 210, 211, 300, 360	– –
Secondary ed. majors	(see content major requirements)	(see content major requirements)	
Elected Studies	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–
Engineering	L: MATH 095, 171, 191, 192, 280, 291 M: MATH 171, 191, 192, 280, 291 H: MATH 191, 192, 280, 291	L: MATH 099, 171, 191, 192, 290, 291, 300, 320 M: MATH 171, 191, 192, 290, 291, 300, 320 H: MATH 191, 192 290, 291, 300, 320	
English	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–
History	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–
International Studies	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–
KIN - Exercise Science, Human Perform & Fitness	L: MATH 095, 151/171, STAT 213 M: MATH 151/171; STAT 213 H: STAT 213	L: MATH 099, 171, STAT 213 M: MATH 171; STAT 213 H: STAT 213	
KIN - Sport Management	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–

Program/Major	Current Requirement	Recommended Requirement	
Mathematics	Lots	Lots	
Modern Languages majors	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–
Music majors	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–
Nursing - BSN	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–
Philosophy	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–
Physics	L: MATH 095, 171, 191, 192, 291, 320 M: MATH 171, 191, 192, 291, 320 H: MATH 191, 192, 291, 320	L: MATH 099, 171, 191, 192, 291, 320 M: MATH 171, 191, 192, 291, 320 H: MATH 191, 192, 291, 320	
Political Science majors	L: MATH 095, 151/171, STAT 213 M: MATH 151/171; STAT 213 H: STAT 213	L: QUANT 113; STAT 213 M: QUANT 113/MATH 171; STAT 213 H: STAT 213	–
Psychology - BA, Forensic Psychology	L: MATH 095, 151/171, STAT 213 M: MATH 151/171; STAT 213 H: STAT 213	L: QUANT 113; STAT 213 M: QUANT 113/MATH 171; STAT 213 H: STAT 213	–
Psychology - BS, Neuroscience, Forensic Psych	L: MATH 095, 151/171, STAT 213, rec. MATH 191 M: MATH 151/171; STAT 213; rec. MATH 191 H: STAT 213 ; rec. MATH 191	L: MATH 171; STAT 213; rec. MATH 191 M:MATH 171; STAT 213; rec. MATH 191 H: STAT 213; rec. MATH 191	
Sociology & Criminal Justice	L: MATH 095, 131/151/152/171 or CSCI 281; CRJU 430 M: MATH 131/151/152/171 or CSCI 281; CRJU 430 H: CRJU 430	L: QUANT, CRJU 430 M: QUANT, CRJU 430 H: CRJU 430	–
Theatre	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–
Theology	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–
Women's Studies	L: MATH 095, MATH 131/151/152/171 or CSCI 281 M: MATH 131/151/161 or CSCI 281 H:	L: QUANT M: QUANT H:	–

Notes: QUANT = QUANT 113/131, CSCI 281, ECON 201/202; FNCE 200; CHEM 103; or any MATH 100+
L = Low ACT (current ACT≤17; proposed ACT≤21)
M = Middle ACT (current 18≤ACT≤22; proposed 22≤ACT≤27)
H = High ACT (current ACT≥23; proposed ACT ≥ 28)
– = fewer credits required
+ = more credits required

Change EDUC 317 into MATH 211: Math Concepts for Teachers

Proposal: Change EDUC 317: Math Concepts for Teachers into MATH 211: Math Concepts for Teachers

Impact: Both Teacher Education Program and Mathematics Department sections of the catalog will need to be updated to reflect this change. Since the course was approved by EPC for the Teacher Education Program, the course will be scheduled and staffed by the Teacher Education Program. As the Math Department and Teacher Education Program continue to plan improvements to Elementary and Secondary Mathematics Education majors, we will revisit the issues of scheduling and staffing courses.

Rationale: The course "gives prospective elementary school teachers insights into the application of mathematical reasoning, critical thinking skills, and topics related to mathematical content standards." In completing the course, students demonstrate their achievement of 14 outcomes in algebra, geometry, measurement, and data analysis and probability.

The course description and student learning outcomes align more with the mission of the Mathematics Department than the mission of the Teacher Education Program.

The mission of the Teacher Education Program is to "prepare teachers who are professionally ethical, possess the knowledge and skills in current educational theory and practice needed to serve all learners in diverse current educational environments, and who possess the general skills needed to adapt to and create the learning environments of the future." Outcomes from this course align with only 1 of the 21 Teacher Education program outcomes (Danielson components and professional teaching dispositions): "Demonstrating knowledge of content and pedagogy."

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." All 14 student learning outcomes from this course are clearly aligned with this mission.

The Mathematics Department traditionally houses math-focused, major-specific courses. Currently, the Mathematics Department offers MATH 161: Math for Business & Economics for College of Business majors and MATH 210: Theory of Arithmetic for Elementary Education majors. The current practice is that the Math Department schedules and staffs courses that are recommended or required for specific majors as long as those courses are open to students in other majors. For example, while MATH 152: Trigonometry is required for Physical Therapy students, it is a General Education course that is open to all students.

The Mathematics Department does not schedule or staff courses that are required by specific majors and not open to other students. For example, MATH 210 is required for Elementary Education majors and is "limited to candidates for elementary teaching licensure or certificate." While the course has a MATH prefix, the Teacher Education Program schedules and staffs MATH 210. Likewise, MATH 338 is required for Secondary Math Education majors and is not open to students in other majors. The Teacher Education Program schedules and staffs MATH 338.

Because Elementary Education majors need a broad understanding of mathematics, the outcomes of this course mirror outcomes across several other mathematics courses. The 4 Algebra outcomes of this course mirror outcomes in MATH 151 and 171; the 3 Geometry outcomes mirror outcomes from MATH 152, 171, and 360; the 7 probability and statistics outcomes mirror those in MATH 171, STAT 213, and MATH 300. Because outcomes from this course mirror those in our 100- and 200-level courses, this course is better described as a 200-level course. Also, since it has a prerequisite of MATH 210, it is logical to name this course MATH 211: Math Concepts for Teachers

Support: Statement from Director of Teacher Education Program (program review, p. 5)

Reduce prerequisites for MATH 220 from MATH 191 to MATH 171

Proposal: Change the prerequisites for MATH 220: Introduction to Logic & Proof from MATH 191: Calculus I to MATH 171: Elementary Functions.

Impact: This will help mathematics and math education majors, particularly transfer students, complete introductory requirements in their first year. With this change, students with no background in Calculus could take MATH 191, MATH 220, and MATH 300 during their first semester. Since outcomes in MATH 220 are not related to, and do not depend upon, outcomes in MATH 191, this proposed change should not impact student performance.

Rationale: In reviewing student learning outcomes in MATH 220, we realized students do not need to complete MATH 191 to be successful in this course. This also will allow transfer students to take more mathematics classes during their first semester, possibly enabling them to graduate more easily on-time.

Support: The Department fully supports this proposal.

Eliminate MATH 230: Topics in Mathematics

Proposal: Eliminate MATH 230: Topics in Mathematics

Impact: We have not offered this course in the past five years.

Rationale: There is no student interest for a 200-level math topics course.

Support: The Department fully supports this proposal.

Eliminate MATH 280 and Require MATH 290/300/320 for Engineering Majors

Proposal: Eliminate MATH 280: Engineering Math. Require Industrial and Mechanical Engineers to take MATH 290: Linear Algebra, MATH 300: Modern Probability & Statistics, and MATH 320: Differential Equations.

Impact: This proposal will eliminate MATH 280, a 4-credit course for Engineering majors. It will increase enrollment in our MATH 290, 300, and 320 courses. We may need to offer one additional section of both MATH 290 and MATH 300 each year. We should be able to accommodate the increased enrollment without needing additional sections of MATH 320.

From the perspective of the Engineering programs, this proposal will eliminate MATH 280 and ENGR 250 (a 7-credit reduction) and add MATH 290, 300, 320 (a 9-credit increase) to major requirements.

From an institutional perspective, this proposal will have little overall impact on staffing resources needed:

- Eliminate 1 section of MATH 280 each year (-1 course; -4 credits)
- Eliminate 1 section of ENGR 250 each year (-1 course; -3 credits)
- Add 1 section of MATH 290 each year (+1 course; +3 credits)
- Add 1 section of MATH 300 each year (+1 course; +3 credits)
- Require the Mathematics Department to offer MATH 320 each year (currently offered every 3 semesters)

Rationale: These changes are being made by the Department of Engineering & Physics in response to the recent ABET site visit. The request can be found on page 22 of the Mathematics Program Review.

Support: The Department fully supports this proposal.
The Engineering & Physics Department requested this proposal (see page 22 of Program Review)

Rename MATH 300, 301, 305 and Cross-list as STAT 300, 301, 305

Proposal: Change MATH 300: Probability & Statistics I to MATH 300: Modern Probability & Statistics.
Change MATH 301: Probability & Statistics II to MATH 301: Regression & the General Linear Model
Change MATH 305: Data Analysis to MATH 305: Modern Data Analysis
Cross-list MATH 300, 301, and 305 as STAT 300, 301, and 305
Reduce the prerequisites of MATH/STAT 300 from MATH 191 to MATH 171
Reduce the prerequisites of MATH/STAT 301 from MATH 300 to "MATH 300 or STAT 213"
Reduce the prerequisites of MATH/STAT 305 from MATH 300 to "MATH 300, STAT 213, or ENGR Statistics"

Impact: The new names and cross-listing will need to be reflected in the Catalog. Reducing the course prerequisites will provide more opportunities for students who complete STAT 213 to continue their study of statistics.

Rationale: Coinciding with the increased student interest in statistics, research into effective methods and structures for teaching undergraduate statistics has grown. The research base now includes the following organizations, major publications, and resources: Guidelines for Assessment and Instruction in Statistics Education (GAISE) Report (2010); ASA/MAA Joint Committees on Undergraduate Statistics (2000-current) and Curriculum in Stats and Probability (2010-current); Journal of Statistics Education (1993-current); Statistics Teacher Network (1982-current); Adapting and Implementing Innovative Material in Statistics (AIMS, 2010); Change Agents for Teaching and Learning Statistics (CATALST, 2004-current); Consortium for the Advancement of Undergraduate Statistics Education (CAUSEweb.org, 2006-current); the NSF-Funded Concepts of Statistical Inference: Randomization-Based Curriculum (2009-current); Assessment Resource Tools for Improving Statistical Thinking (ARTIST, 2003-current); and Statistics Education Research Journal (1987-current).

This research has pointed out many faults with traditional undergraduate statistics teaching and learning. One of these faults is the lack of a clear identity for undergraduate statistics programs and courses:

> *Many colleges still do not offer an undergraduate degree in statistics and most likely do not have the financial resources to begin doing so in the near future. Also, many students (and the general public) still see statistics as a specialized extension of mathematics* – ***a fact that is only reinforced when many introductory (and advanced) statistics courses are only offered through a school's math department (and designated as such in the course catalog…)*** (Kotz, 2010).
>
> *Although statistics requires mathematics for the development of its underlying theory,* ***statistical reasoning differs from mathematical reasoning and statisticians use many non-mathematical skills. Thus the curriculum must be more than a sequence of mathematics courses****. Faculty trained in statistics should be involved in developing an undergraduate curriculum in statistical science at any particular institution (Bryce, et. al., 2000)*.
>
> *It is well known that* ***mathematics departments teach about four times as many students in introductory statistics courses as do statistics departments*** *(Loftsgaarden & Watkins, 1998)*

We propose these changes to ensure our statistics courses align with best practices and to better represent the modern statistics topics and methods covered in the course. The new names better distinguish these courses (with a focus on probability, randomization methods, statistical computing, robust, and nonparametric methods) from the applied statistical methods (normal-distribution-based) courses taught in other departments.

The content of MATH/STAT 300 will evolve slightly from MATH 300 to incorporate more modern statistical methods, such as randomization-based methods, Bayesian methods, simulation, resampling, and maximum likelihood. The course outcomes will shift focus away from a list of statistical techniques and towards developing students to think like statisticians. Since many modern statistical methods rely less on sophisticated mathematics and more on modeling and simulation, course prerequisites will be lowered so that students who complete MATH 171 (or above) may enroll. The course will continue to meet

requirements for Math Education and Mathematics majors by supplementing content for those students with Calculus-based activities.

Similarly, the content of MATH/STAT 301 will evolve from MATH 301 to incorporate more modern statistical methods. Course prerequisites will be expanded so that students completing STAT 300 or STAT 213 may enroll. Since this course focuses on the General Linear Model (ANOVA-based experimental design, multiple linear and nonlinear regression, and more advanced techniques), students who completed STAT 213 will be prepared with their understanding of ANOVA and simple linear regression. Course activities will be supplemented with Calculus-based activities for Math and Math Education majors.

MATH/STAT 305 will evolve from MATH 305 to become a project- or case-study-based course with a focus on modern statistical methods and computer applications (SPSS Modeler, Stata, R, StatCrunch, Tableau). The prerequisites will be expanded to allow students who complete either STAT 213, STAT 300, or STAT 301 to enroll. This course will focus less on statistical methods and more on the art and science of data analysis. Because of this, STAT 305 could eventually evolve into a capstone course for a minor or concentration in statistics.

Support: The Department fully supports this proposal.

Sources:

Bryce, G.R. et. al. (2000). Curriculum guidelines for Bachelor of Science degrees in statistical science: a preliminary proposal. Accessed 8/31/2010 from site: http://www.amstat.org/meetings/jsm/2000/usei/curriculum.PDF

Cobb, G. & Moore, D.S. (1997). Mathematics, statistics, and teaching. The American Mathematical Monthly, 104, 801–823.

Cobb, G. (1992). Teaching statistics. Heeding the Call for Change, MAA Notes No. 22, The Mathematical Association of America, 3–46.

GAISE College Report (2010). Guidelines for Assessment and Instruction in Statistics Education. Accessed 8/31/2010 from site: http://www.amstat.org/education/gaise/

Kotz, B.C. (2010). Thoughts on the importance of the undergraduate statistics experience to the discipline's (and society's) future. The American Statistician, 64(1), 15-18.

Loftsgaarden, D. O., & Watkins, A. E. (1998). Statistics teaching in colleges and universities: Courses, instructors, and degrees in fall 1995." The American Statistician, 4, 308-314.

Moore, D.S. et. al. (1988). Should mathematicians teach statistics? The College Mathematics Journal, 19, 3–34.

Soler, F.P. (2010). Who is teaching introductory statistics? The American Statistician, 64(1), 19-20.

Tarpey, T., et. al. (2000). Curriculum guidelines for Bachelor of Arts degrees in statistical science. Accessed 8/31/2010 from site: http://www.amstat.org/education/pdfs/BA-curriculum.pdf

Stop Cross-Listing EDUC 338 as MATH 338

Proposal: Eliminate the MATH 338 cross-listing of EDUC 338: Content Literacy.

Impact: The Catalog will need to reflect this change.

Rationale: The content and outcomes of this course better align with the Teacher Education Program.

Support: Statement from Director of Teacher Education Program (program review, p. 5).

Add MATH 220 as a prerequisite for MATH 360

Proposal: Add MATH 220: Introduction to Logic & Proof as a prerequisite for MATH 360: Modern Geometry.

Impact: This current prerequisite for MATH 360 is MATH 192: Calculus II. Since students will now be able to complete MATH 220 prior to even taking MATH 191 or 192, this should not impact the time it takes for students to complete degree requirements. By forcing students to complete a course in logic and proof, students will be better prepared for the axiomatic approach of MATH 360.

Rationale: Based on Department discussions and a review of student work, we have not been satisfied with the level of student achievement in MATH 360. Students enrolling in the course anticipate a geometry course to be similar to their high school geometry courses. When they encounter the axiomatic approach of MATH 360, they find themselves unprepared. Requiring MATH 220 as a prerequisite will better prepare our students for MATH 360 and will allow us to maintain high standards in the course.

Support: The Department fully supports this proposal.

Add the WI designation to MATH 380

Proposal: Add the writing intensive designation to MATH 380: Abstract Algebra.

Impact: The Catalog will need to reflect this change. All Math and Math Education majors are required to complete this course.

Rationale: This course required more writing, and more evaluation of writing, than our current 1-credit MATH 395 and MATH 396 courses. Having a 3-credit, 300-level writing intensive course will also put us more in-line with other departments.

Support: Statement from Michael Hustedde (program review, p. 20)

Remove the WI designation from MATH 395

Proposal: Remove the writing intensive designation from MATH 395: Seminar in Mathematics.

Impact: The Catalog will need to reflect this change. All Mathematics and Mathematics Education majors are required to take this course. They will fulfill writing intensive requirements through MATH 380.

Rationale: MATH 380 better meets writing intensive guidelines.

Support: Statement from Michael Hustedde (program review, p. 5)

Eliminate MATH 396

Proposal: Eliminate MATH 396.

Impact: This course will be removed from the requirements for a B.S. in Mathematics. MATH 395 will be strengthened to meet outcomes that were intended for this course.

Rationale: The Math Department is unsatisfied with the outcomes are students were able to attain in this 1-credit seminar.

Support: The Department fully supports this proposal.

Create MATH 399: Postsecondary Clinical Teaching Experience

Proposal: Create MATH 399: Postsecondary Clinical Teaching Experience, a 3-credit capstone course required for Secondary Math Education majors. We will require departmental approval to enroll in this course.

Impact: Secondary Math Education majors will take this course 1 or 2 semesters prior to their student teaching experience. With the proposed 3-credit decrease in computer science requirements, this will not result in an increase in the overall number of credits for our Math Education major.

This course will improve the content knowledge and pedagogical preparation of our secondary math education majors. It will also give these students experience teaching at a postsecondary level and experience developing, implementing, and evaluating online courses.

We may allow mathematics majors (or students in related majors) to enroll in this course if they are interested in gaining some clinical experience in postsecondary teaching.

Rationale: In discussions with current and former secondary math education majors, one common request has been the addition of a clinical course where students could (1) remediate any weaknesses they have in the content they would be expected to teach at a secondary level, and (2) gain more experience in the planning, delivery, and evaluation of math teaching. This course is being created in response to our students' requests.

While faculty in the Department work to develop the (college-level math) content knowledge of our math education majors, we rarely get the chance to identify and remediate weaknesses in (pre-college-level math) content that they will be expected to teach. We also rarely get the opportunity to observe their teaching performance and course management skills. With student interest in teaching at the postsecondary level and demand for instructors who have experience with online course delivery, we believe this course will greatly benefit our majors

Support: The Department fully supports this proposal.
Statement from Judith White (program review, p. 5)

Eliminate MATH 490: Independent Study

Proposal: Eliminate MATH 490: Independent Study.

Impact: We have not offered this course in the past 5 years.

Rationale: Our MATH 395-396 seminar courses and MATH 400: Topics course fulfill the needs of this course.

Support: The Department fully supports this proposal.

Impact of Proposals on Scheduling and Staffing

As a result of the changes proposed in this document, we anticipate the following scheduling and staffing advantages:

1) Offering an online MATH 099 course will facilitate scheduling and open up classroom space, even after factoring in any potential enrollment increase due to increased placement standards. We anticipate the elimination of the institutional mathematical reasoning requirement will also offset any impact of the increased placement standards.

2) The proposed changes will reduce our General Education offerings (at least those courses specifically designed to address General Education outcomes) by one course. Instead of scheduling sections of MATH 131, 151, 152, 161, and 171, we will schedule QUANT 113, 131, MATH 152, MATH 171. With fewer courses, we anticipate being able fill these sections (rather than offering some under-enrolled sections).

3) The proposed changes will allow us to better meet increasing demands from Industrial Engineering and Mechanical Engineering programs. If engineering enrollments grow as projected, we will be better positioned to staff an increasing number of sections of MATH 191, 192, 280, and 291.

4) The proposed changes will reduce our need to offer independent studies. By identifying more required courses for our Math and Math Education majors, we reduce electives and reduce our students' dependency on independent studies.

5) The proposed changes will allow us to schedule a 2-year rotation of courses and facilitate advising.

The tables on the next two pages display our course offerings from Fall 2007 to (projected) Spring 2014. As the tables show, our proposed changes will allow us to serve a greater number of students with fewer staffing needs and classroom space.

										Proposed				
F 07	S 08	F 08	S 09	F 09	S 10	F 10	S 11	F 11	S 12	F 12	S 13	F 13	S 14	
090-A	090-A 090-B	090-A												
095-A 095-B 095-C	095-A 095-B	095-A 095-B 095-C	095-A 095-B 095-C		095-A 095-B 095-C 095-X	095-A 095-B 095-C 095-D	095-A 095-B 095-C	095-A 095-C 095-D	095-A 095-B	099-A/B 099-C/D	099-A/B	099-A/B 099-C/D	099-A/B	Developmental
										Q113-A		Q113-A	Q113-A	
131-A 131-B	131-A 131-B	131-A 131-B 131-C	131-A 131-B		131-A 131-B	131-A 131-B 131-C	131-A 131-B	131-A 131-B 131-C	131-A 131-B 131-C	Q131-A Q131-B Q131-C	Q131-A Q131-B Q131-C	Q131-A Q131-B Q131-C	Q131-A Q131-B Q131-C	
151-A 151-B 151-C 151-D 151-E 151-M	151-A 151-B 151-C 151-D 151-E	151-A 151-B 151-C 151-D 151-E 151-M	151-A 151-B 151-C 151-D 151-E		151-A 151-B 151-C 151-D 151-E 151-F	151-A 151-B 151-C 151-D 151-E 151-F	151-A 151-B 151-C 151-D 151-E	151-A 151-B 151-C	151-A 151-B 151-C	151-A 151-B	151-A 151-B			
152-A	152-A	152-A	152-A		152-A	152-A 152-B	152-A 152-X	152-A 152-B	152-A	152-A	152-A	152-A	152-A	
161-A 161-B	161-A 161-B	161-A 161-B	161-A		161-A 161-X	161-A	161-A							
171-A		171-A	171-A		171-A	171-A		171-A 171-B 171-C	171-A 171-B 171-C	171-A 171-B 171-C 171-D	171-A 171-B 171-C	171-A 171-B 171-C 171-D 171-E	171-A 171-B 171-C 171-D	GenEd
191-A 191-M	191-A	191-A 191-B	191-A		191-A 191-M	191-A 191-M	191-A 191-M	191-A 191-M	191-A	191-A 191-B	191-A	191-A 191-B	191-A	
192-A	192-A 192-M	192-A	192-A 192-M		192-A	192-A	192-A 192-M	192-A	192-A 192-M	192-A	192-A 192-M	192-A	192-A 192-M	
220-A		220-A				220-A		220-A		220-A		220-A		
280-A		280-A				280-A		280-A			290-A		290-A	
	290-A		290-A		290-A		290-A		290-A		290-B		290-B	
	291-A		291-A		291-A		291-A			291-A		291-A		Major/Engr.
300-M		300-A				300-A 300-M		300-A 300-B		300-A 300-B		300-A 300-B		
	301-M		301-A		301-A 301-M		301-A 301-M		301-A 301-B		301-A		301-A	
	320-A					320-A			320-A		320-A		320-A	
	340-A		340-A		340-A		340-A		340-X	340-A				
360-A		360-A 370-A				360-A	370-A	360-A 375-X	360-A	370-A		360-A		
380-A					380-A			380-X				380-A		
395-A	396-A	395-A	396-A		395-A 396-A	395-A	396-M	395-A	396-A	395-A 399-A	395-A	395-A 399-A	395-A	
					400-A				400-A		400-A		400-A	Major

(does not include MATH 210 or 211; assumes no overall growth or IE/ME growth)

	Fall	Spring	Total Academic Year
2007-08	12 Developmental credits 36 GenEd credits 16 Calculus/Engineering credits 13 Upper-level credits --- 77 credits total	12 Developmental credits 30 GenEd credits 16 Calculus/Engineering credits 13 Upper-level credits --- 71 credits total	24 Developmental credits 66 GenEd credits 32 Calculus/Engineering credits 26 Upper-level credits --- 148 credits total
2008-09	12 Developmental credits 39 GenEd credits 16 Calculus/Engineering credits 13 Upper-level credits --- 80 credits total	9 Developmental credits 30 GenEd credits 16 Calculus/Engineering credits 10 Upper-level credits --- 65 credits total	21 Developmental credits 69 GenEd credits 32 Calculus/Engineering credits 26 Upper-level credits --- 148 credits total
2009-10		12 Developmental credits (3 IS) 36 GenEd credits (3 I.S.) 16 Calculus/Engineering credits 20 Upper-level credits (1 I.S.) --- 84 credits total (7 ind. study)	
2010-11	12 Developmental credits 39 GenEd credits 16 Calculus/Engineering credits 16 Upper-level credits --- 83 credits total	9 Developmental credits 30 GenEd credits (3 ind. study) 20 Calculus/Engineering credits 16 Upper-level credits --- 75 credits total (3 ind. study)	21 Developmental credits 69 GenEd credits (3 ind. study) 36 Calculus/Engineering credits 32 Upper-level credits --- 158 credits total (3 ind. study)
2011-12	9 Developmental credits 33 GenEd credits 16 Calculus/Engineering credits 19 Upper-level credits (6 I.S.) --- 77 credits total (6 ind. study)	6 Developmental credits 30 GenEd credits 12 Calculus/Engineering credits 22 Upper-level credits (3 I.S.) --- 70 credits total (6 ind. study)	15 Developmental credits 63 GenEd credits 28 Calculus/Engineering credits 41 Upper-level credits (9 I.S.) --- 147 credits total (9 ind. study)
2012-13	6 Developmental credits 33 GenEd credits 19 Calculus/Engineering credits 16 Upper-level credits --- 74 credits total	6 Developmental credits 27 GenEd credits 15 Calculus/Engineering credits 13 Upper-level credits --- 61 credits total	12 Developmental credits 60 GenEd credits 34 Calculus/Engineering credits 29 Upper-level credits --- 135 credits total
2013-14	6 Developmental credits 30 GenEd credits 19 Calculus/Engineering credits 16 Upper-level credits --- 71 credits total	6 Developmental credits 27 GenEd credits 15 Calculus/Engineering credits 13 Upper-level credits --- 61 credits total	12 Developmental credits 57 GenEd credits 34 Calculus/Engineering credits 29 Upper-level credits --- 132 credits total

Notes: 2011-12 increase in independent study credits was in preparation for proposed scheduling changes
Developmental credits include MATH 090, 095, 099
General Education credits include: MATH 131, 151, 152, 161, 171; QUANT 113, 131
Calculus/Engineering credits include: MATH 191, 192, 280, 291
Upper-level credits include: MATH 220, 290, 300, 301, 320, 340, 360, 370, 375, 380, 395, 395, 400
Numbers do not include MATH 210 or MATH 211, which are both staffed by the Teacher Education Program

Response to faculty questions about proposals

This is an email response to a faculty member who had questions about the proposals. The name of the faculty member and the original questions are not included

Thanks for sending the questions. Our Department has been trying to have an open dialogue with faculty from other departments, so we do appreciate you taking the time to review our proposals and ask questions.

I think we have 3 issues here:
1) The elimination of MATH 151 (which won't require any students to take additional math courses)
2) The proposed paths to STAT 213 (which would require non-science-related majors to take fewer math courses)
3) The increased placement standards (which could require some science-related majors to take MATH 099, an online, adaptive developmental program that will serve as a prerequisite to MATH 171)

1) MATH 151 and MATH 171 truly are equivalent (but not identical) classes. They have the same prerequisites, claim to cover much of the same content, and share a significant number of student learning outcomes. The main difference is that MATH 151 covers topics that would only be of interest to students who plan on majoring in mathematics (such as mathematical induction, polynomial division methods, and some of the more esoteric matrix algebra manipulations). MATH 171, on the other hand, approaches the important topics (linear, polynomial, exponential/logarithmic, rational, and trigonometric functions) in a more coherent, logical manner (focused around the concept of a function). We're only proposing to eliminate MATH 151 because (a) we truly believe (and have data to demonstrate) MATH 171 is the superior course, and (b) many other universities do not allow College Algebra to count as a college-level course (which could hurt any students who transfer out from SAU). It's not just the University of Iowa who is doing it -- in fact, we weren't aware they were doing it until after we proposed eliminating the course.

2) You're correct that the paths to STAT 213 (especially the one that includes QUANT 113) have no impact on your majors. These paths are simply options for students to take STAT 213. They are for other majors, such as Psychology and other social sciences, who may decide to allow students to take alternative routes to STAT 213. All science-related majors require MATH 151/171, so the paths have no impact on their students.

3) The decision to eliminate MATH 151 has no relationship to the decision to increase placement standards. Our placement standards are being changed because they are embarrassingly and dangerously low (even when we compare ourselves to community colleges and one fashion institute). The proposed changes to our placement standards will still leave SAU with lower standards than any other school we can find -- they'll just give us standards that are honest (matching minimum recommendations from ACT -- source: http://www.act.org/research/policymakers/pdf/ACT_STEM_PolicyRpt.pdf).

We've given placement tests in our MATH 151 course for a few years now and we've found that it's much higher than 57% of our students who need remedial courses. That's one of the reasons why we've been unable to administer a (real) placement test to our incoming students -- we know we'd be unable to serve so many students in remedial courses. It's also why we've been unable to really teach *college-level* algebra in MATH 151. If you look at the course content being taught in MATH 151 and compare it to what was taught in the course 10-15 years ago, it's clear that we've let the course become a junior-high-to-high-school level math course. We haven't been pressured into doing that by any external force, but it's happened naturally as the class has evolved to meet the ability level of students.

When we look at data from 2008-2010, our proposed placement changes should only require us to offer 2 additional sections of mathematics courses each year. That's because we're allowing non-technical majors (humanities majors) to meet graduation requirements with a single math course (that has no prerequisites at all). The placement standards will only impact students majoring in areas that have identified a math requirement. Our logic is that if these majors require math, we're obligated to actually teach that level of math to those students.

As an example, consider a student who enters SAU with an ACT Math score of 17, 18, or 19 (the 34th, 41st, or 47th percentiles of high school students nationwide). According to ACT, that student may be able to solve one-

step problems, but cannot add or subtract simple algebraic expressions or solve equations (source: http://www.act.org/standard/planact/math/index.html). According to our current placement standards, we stick that student into MATH 151. In MATH 151, that student is then surrounded by other students who are also underprepared for the course content (because we do not require any math courses for virtually all the students who are prepared for college-level math). The instructor, not wanting to fail the majority of the class, spends weeks of class time remediating skills. By the end of the course, we're lucky if we're able to cover half of what should be taught in a college algebra course.

With our new placement standards, a student with an ACT Math score of 12-21 will be placed into our online, adaptive MATH 099: Developmental Mathematics course. If the student is close to being ready for college-level math, that student may complete the course quickly. If the student needs more remediation, it will take the student longer to complete the course. Either way, by the time a student finishes MATH 099, we'll have documented evidence that the student is prepared for college-level math (MATH 171). Then, in MATH 171, we'll have a class of students who are prepared for the content that other departments want us to teach.

I guess the short explanation is this: If your majors need to have college-level math skills, they are almost certainly not getting those skills from MATH 151 and our current placement system. With the increased placement standards, we will be able to ensure your majors completing MATH 171 will have college-level math skills.

I'll attempt to address your other questions:
Q) How does admissions convince students to come here and retake high school math for almost $800 a credit hour?
A) I don't want to be flippant, but they're already doing this. Students taking MATH 095 are retaking middle school math. Students taking MATH 151 are retaking high school (Algebra I-II) math. We're proposing to eliminate those two courses and create a single online MATH 099 course. We're hoping, in the near future, to charge students significantly less than the standard tuition rate. We're also hoping to allow incoming students to complete the course prior to enrollment at a very low cost (perhaps as low as $50).

We've consulted with Maureen Baldwin (primarily) as we investigated how our proposed changes would impact incoming students.

I would also ask -- again, I'm trying not to be flippant -- how does admissions currently convince students to come here and *graduate* with nothing more than high school level math?

Q) Do they really need the higher math?
A) It depends who "they" are and what "higher" math is. As a department, we decided that non-technical majors do not need much mathematical knowledge/skills. That's why we're proposing additional options for students to complete General Education requirements through a single (prerequisite-free) course. The University already agreed with this decision by approving the prerequisite-free CSCI 281 course as fulfilling General Education requirements.

As a department, we also decided that we need to be held accountable for teaching students in majors that specify required math courses. That means that if algebraic skills are required for a course like CHEM 105, we need to be held accountable for actually teaching those skills to those students. So our model, going forward, is that if a major or course specifies a math prerequisite (or requirement), we're going to try to ensure students possess those required skills by the end of the course.

We're hoping this will encourage departments to more closely examine any math courses they require as part of their programs. We're more than willing to work with departments to design the most appropriate courses for their students.

So I guess my answer is that no student needs any math higher than what their major requires. Students in majors requiring MATH 151 will now take MATH 171, which is not at all a higher-level course. We're only going to ensure that we actually teach what we claim to teach in our courses.