The faculty in the Mathematics Department endorse the following proposals:

1) Rename the department to the **Department of Mathematics and Statistics**
2) House, coordinate, staff, and schedule STAT 213: Applied Statistical Reasoning for the Sciences
3) Hire a visiting line in statistics to begin in 2013-14
4) Work towards the development of a statistics concentration for our majors, a minor, several potential statistics-related interdisciplinary minors, and (possibly) a major in statistics/actuarial science
5) Rename *STAT 301: Regression & the General Linear Model* to *STAT 301: Statistical Modeling*
6) Eliminate MATH 152, 371, 381, and our *Secondary Teacher's Certificate with a Minor in Mathematics* program.

Rationale:

1) Rename the department to the Department of Mathematics and Statistics.

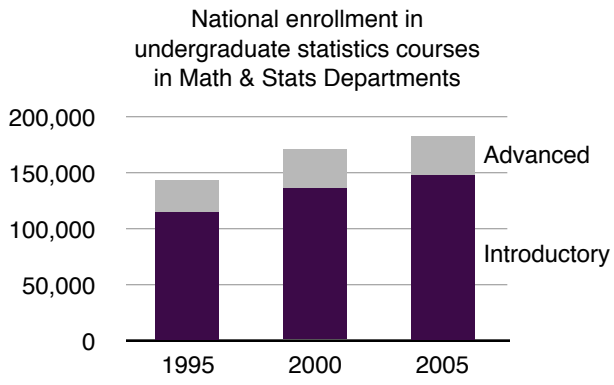
In our program review approved by EPC in December 2011, we set the following goal:

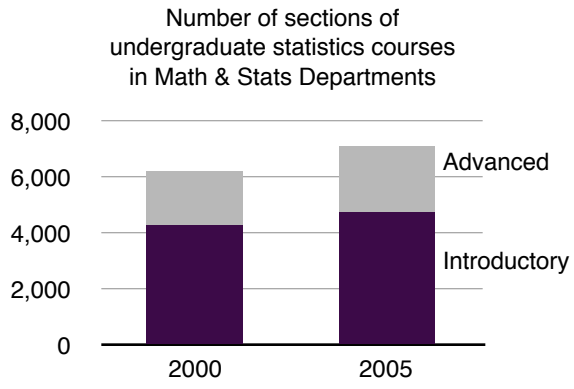
• Work towards a "Department of Mathematics and Statistics" with a B.S. in Statistics and Actuarial Science and a statistics minor.	• We are noticing a growing number of students interested in statistics and actuarial science. With our existing faculty and courses, it would not take too much more to offer such a program.	• We will keep this potential program in mind as we fill our staffing needs. We will begin the process of proposing a new program, identifying community need, student demand, and program costs. We may propose this new program at our next program review.

Our first step towards this goal was to modify our curriculum to offer three statistics courses:

1) STAT 300: Modern Introduction to Probability & Statistics
2) STAT 301: Statistical Modeling
3) STAT 305: Modern Data Analysis

This proposal to rename our department to the *Department of Mathematics and Statistics* is the next step towards our goal. The new name better reflects our curricular offerings and our staffing expertise (with one Professionally Accredited Statistician and another visiting assistant professor with significant training in statistics). It also better positions us for the national trend of growing student interest and enrollment in applied mathematics and statistics programs.





Source: Statistical Abstract of Undergraduate Programs in the Mathematical Sciences in the United States, 2007
http://www.ams.org/profession/data/cbms-survey/chapter3.pdf

The authors of a 1998 review of undergraduate statistics courses lamented the fact that "... mathematics departments teach about four times as many students in introductory statistics as do statistics departments" (Loftsgaarden & Watkins, 1998). The dearth of statistics departments and programs was echoed in 2010 in *The American Statistician:*

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).

While we agree that the creation of a new department and major in statistics does not make financial sense at this time, naming our department the *Department of Mathematics and Statistics* acknowledges the importance of statistics at SAU and gives a home to the coordination of statistics courses and programs.

The new name also reflects current practice at other institutions. Searching for "department of mathematics and statistics" yielded more than 578,000 results. A quick review of 20 postsecondary institutions in Iowa finds that while only 2 (of our aspirational peers) have "Departments of Mathematics & Statistics," 19 of the institutions house their introductory and advanced statistics courses within their Mathematics Departments.

School	Department of Mathematics & Statistics	Introductory statistics courses taught within Math Department	Website
Cornell	X	X	http://www.cornellcollege.edu/mathematics/
Grinnell	X	X	http://www.grinnell.edu/academic/mathstats
Briar Cliff		X	http://www.briarcliff.edu/departments/mathematics/new_mathematics/courses.aspx
Central		X	http://www.central.edu/academics/supportDocs/courseCatalog.pdf
Clarke		X	http://www.clark.edu/academics/catalog/descriptions.php?dep=MATH
Coe		X	http://www.coe.edu/academics/mathcompsci/mathcompsci_curriculum
Dordt		X	http://www.dordt.edu/academics/programs/math/program_options.shtml
Graceland		X	http://www.graceland.edu/
Grand View		X	http://www.grandview.edu/aspx/audience/programlanding.aspx?aid=17&pid=7
Loras		X	http://depts.loras.edu/academics/catalog/2010-12bulletin.pdf#page=163
Luther		X	http://www.luther.edu/catalog/3922.htm
Morningside		X	http://webs.morningside.edu/math/Courses.htm
Mount Mercy		X	http://www.mtmercy.edu/mathematics-course-offerings
Northwestern C		X	http://www.nwciowa.edu/math/courses
Simpson		X	http://www.simpson.edu/math/
Upper Iowa		X	http://uiu.edu/academics/catalog/pdfs/FayetteRUcatalog11-12.pdf
Waldorf		X	http://www.waldorf.edu/Residential/Academics/Programs/Mathematics/Curriculum---Courses
Wartburg		X	http://www.wartburg.edu/mcsp/about.html
William Penn		X	http://www.wmpenn.edu/Academics/Majors/Applied_Technology/General_and_Applied_Mathematics/
Drake			http://artsci.drake.edu/psychology/courses.html

Changing our department's name would require us to slightly modify our departmental goals. The changes, underlined, would be:

Teaching courses for non-majors:

To provide students mathematical <u>and/or statistical</u> concepts and problem-solving skills appropriate to their discipline

To provide all students an appreciation for mathematics <u>and/or statistics</u>

Teaching courses for mathematics majors:

To provide majors high quality, rigorous coursework that extends their practical and theoretical understanding of mathematics <u>and statistics</u>

To provide majors opportunities to master skills in problem solving, analysis, and research

To provide majors opportunities to develop the ability to communicate effectively in their discipline

Teaching courses for secondary mathematics education majors:

To provide pre-service teachers with courses consistent with state teaching standards, NCTM standards, and best practices

To ensure pre-service teachers have mastered concepts and skills beyond what they will be expected to teach

Professional development and service:
To keep current in our disciplines
To encourage undergraduate research opportunities
To assist our students in seeking employment or admissions to graduate programs
To provide ongoing mentoring and in-service learning opportunities to practice mathematics teachers

2) House, coordinate, staff, and schedule STAT 213: Applied Statistical Reasoning for the Sciences

This proposal also reflects our 2011 program review goal to, "refine our course offerings for non-majors." More specifically, we propose to:

a) List *STAT 213: Applied Statistical Reasoning for the Sciences* under the Department of Mathematics & Statistics in the 2013-15 Catalog, alongside our STAT 300, 301, and 305 courses.
b) Schedule sections of STAT 213 each semester
c) Staff sections of STAT 213 each semester
d) Coordinate the development and evaluation of the curriculum and assessment of STAT 213
e) Evaluate STAT 213 as part of the Department of Mathematics & Statistics program review.

As indicated on the previous page, it is common for mathematics departments to house introductory statistics courses. With our existing statistics courses, STAT 300, 301, and 305, housing STAT 213 within our department will provide a centralized location for our statistics courses. Also, since STAT 300 shares the same prerequisite mathematics course as STAT 213, and since STAT 301/305 list STAT 213 as a prerequisite, this will provide a central location for students interested in statistics to learn about other courses offered at SAU.

We see the field of statistics as an important area of growth, which is why our name change reflects our intent to focus on statistics. We feel this focus in scheduling, staffing, and coordinating STAT 213 sections will benefit students in the course. Also, our work with CAUSE, ARTIST, and CAOS; our awareness of GAISE and AIMS; and our ongoing collaboration with other introductory statistics educators through eCOTS, CATALST, and an NSF DUE grant give us the opportunity to modernize and strengthen the course through assessment and external benchmarking.

With more than 125 seats in STAT 213 open for the Fall 2012 semester (and with 69 students enrolled this past Spring), we think the university will benefit greatly from an increased coordination of STAT 213.

CAUSE: Consortium for the Advancement of Undergraduate Statistics Education
ARTIST: Assessment Resource Tools for Improving Statistical Thinking
CAOS: Comprehensive Assessment of Outcomes in a first Statistics course
GAISE: Guidelines for Assessment and Instruction in Statistics Education
AIMS: Adapting and Implementing Innovative Material in Statistics
eCOTS: Electronic Conference on Teaching Statistics
CATALST: Change Agents for Teaching and Learning STatistics
NSF Due grant #1140629: Developing an Innovative Randomization-based Introductory Statistics Curriculum

3) Hire a visiting line in statistics to begin in 2013-14

Coinciding with our name change and the coordination of STAT 213, we propose hiring a visiting line in statistics to begin in 2013-14. This would not be a new request for a visiting line; rather, it would reflect a change in one of the visiting lines we received approval for in 2011-12. Part of the reason why we have not been able to fill this line is that we lacked a direction for the position. With the major curricular changes we made as part of our 2011 program review, we weren't able to clearly define a specialization for this visiting line. These proposals would give us the opportunity to benefit the university by hiring someone with significant statistics training to:

a) Help coordinate and teach sections of STAT 213, 300, 301, and 305
b) Fulfill university service expectations by assisting with institutional research tasks and data analyses
c) Work towards the development of new programs in statistics (interdisciplinary minors)

d) Continue the development of a statistical consulting center on campus
e) Teach quantitative problem solving General Education courses, as needed

This position will increase staffing flexibility within the Department and will benefit the university as a whole.

6) Work towards the development of a statistics minor, statistics-related interdisciplinary minors, and a major in statistics/actuarial science

In hiring a visiting line in statistics, we would be given opportunities to develop new programs in statistics. Using the Guidelines endorsed by the American Statistical Association (Bryce, et. al, 2000), many of these programs could be developed at very little cost to the institution. This is because statistics programs, by their very nature, are interdisciplinary and require the use of existing courses.

For example, an outline for a potential statistics major would require only one new course:

Mathematical Background:	8 credits	MATH 191, MATH 192
Matrix Algebra:	3 credits	MATH 290
Programming:	3 credits	CSCI 195
Database:	3 credits	CSCI 360
Statistical Theory:	3 credits	STAT 300
Statistical Modeling:	3 credits	STAT 301
Statistical Computing:	3 credits	STAT 305
Advanced Topics (Multivariate, Bayesian):	3 credits	STAT 313 -- NEW COURSE
Capstone Course:	1 credit	MATH 395
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Total:	30 credits	

To meet the ASA Guidelines, this major would also need to include components related to written and oral communication (through GenEd requirements) and a substantive concentration (interdisciplinary minor, second major, concentration). We're not proposing the development of this program; it's only intended to demonstrate how a statistics program could be developed at minimal cost.

Our proposed name change and staffing also affords us the opportunity to investigate the development of several statistics-related interdisciplinary minors (such as *data science, quantitative analysis*, or *psychometrics*). With our existing statistics- and research-focused courses on campus, we could see these interdisciplinary minors attracting students in social sciences, natural sciences, and business.

A quick review of the 2011-13 Catalog shows that we have many courses and programs that could feed into interdisciplinary minors:

Probability:
- QUANT 113: Applied Probability
- STAT 300: Modern Probability & Statistics
- IE 391. Operations Research Probability Models

Mathematical Statistics:
- MATH 191: Calculus I
- MATH 192: Calculus II
- MATH 290: Linear Algebra
- STAT 300: Modern Probability & Statistics

Statistical Methods:
- STAT 213: Statistical Methods
- STAT 301: Statistical Modeling
- STBE 337. Statistics for Business and Economics
- SOC/CRJU 430. Statistics for Sociology and Criminal Justice

Data Analysis:

STAT 305: Modern Data Analysis

Data Science:
- CSCI 185. Script Programming
- CSCI 195. Object-Oriented Programming I
- CSCI 330. Web Programming
- CSCI 360. Database Management Systems
- CSCI 460/560. Data Management

Visual Design:
- ART 210: Graphic Design I
- ART 411: Web Design
- GEOG 360. Maps and Mapping

Applied Research:
- BIOL 401, 402: Biological Research
- MKTG 328. Marketing Research
- STBE/ECON 447. Econometrics
- CHEM 428, 429. Chemical Research
- IE 335. Quality Control and Reliability
- KIN 440. Senior Research I
- WI-PSCI 400. Research in Political Science
- PSYC 215. Research Methods
- PSYC 294, 394, 494. Research Practicum:
- PSYC 332. Psychological Tests and Measurements
- SOC 315. Qualitative and Ethnographic Research Methods

Measurement:
- EDUC 309. Educational Psychology: Tests and Measurements
- ME 310. Engineering Measurements and Instrumentation
- KIN 415. Tests and Measurements

7) Rename STAT 301: Statistical Modeling.

The existing name, *STAT 301: Regression & the General Linear Method*, while more specific, is too cumbersome. The proposed name allows greater flexibility to introduce non-regression-based methods.

8) Eliminate MATH 152, 371, 381, and our *Secondary Teacher's Certificate with a Minor in Mathematics* program.

Alongside these proposals, we'd like to propose to clean-up our course and program offerings by eliminating MATH 152, 371, 381, and our Secondary Teacher's Certificate with a Minor in Mathematics.

In meeting with the Department of Physical Therapy last Spring, it was decided that their students were best served by taking MATH 171 instead of MATH 152. This eliminates the audience for our MATH 152: Trigonometry course. Students who need to learn trigonometry prior to taking Calculus can take our MATH 171: Elementary Functions course.

We have not offered MATH 371 or 381 in the past decade and can use our existing MATH 400: Topics course to meet any future demand we may have for these courses. Likewise, we and the Teacher Education Program are unaware of any students who have completed the Secondary Teacher's Certificate program.

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

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