

New Minor Signature Form

CSU Chico
Curriculum Services

JUN 16 2015

RECEIVED

Minor Name: Applied Statistics

Department Contact(s) w/phone #(s):
Kathy Gray, 898-6329

Required Signatures

The Department of Mathematics and Statistics
has reviewed and approved this new minor

C. Calmado
Chair, Department Curriculum Committee

4/30/15
Date

Chris Ford
Department Chair

1/24/15
Date

The College of Natural Sciences
has reviewed and approved this new minor

Anna Petrova - May Jr
Chair, College Curriculum Committee

2/20/15
Date

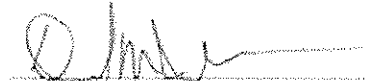

Department Chair

1/29/15
Date

The College of Natural Sciences
has reviewed and approved this new minor


Chair, College Curriculum Committee

2/20/15
Date


College Dean

6/15/15
Date

Send signature page with proposal attached to Curriculum Services at Academic Affairs,
zip 110

AA Review Completed

10/1/15
Date

Note: The department will be notified on the of dates for EPPC, Academic Senate, and Chancellor's Office (if applicable) review and number of copies needed.

Proposal for a New Minor in Applied Statistics

- I. Title: *Minor in Applied Statistics*
- II. Academic year of intended implementation: *Fall, 2015*
- III. Name of the department and college submitting the proposal:
Department of Mathematics and Statistics
College of Natural Sciences
- IV. Statements on questions of need and demand.
 - A. Relation of the minor to the University Strategic Plan.

The minor in Applied Statistics embraces all six university strategies, however, this proposal is most aligned with strategic priorities #1 and #3:

 1. Believing in the primacy of learning, we will continue to develop high-quality learning environments both inside and outside the classroom.
 3. Believing in the wise use of new technologies in learning and teaching, we will continue to provide the technology, the related training, and the support needed to create high quality learning environments both inside and outside the classroom.

The proposed minor introduces students to statistical methodology by requiring applied statistics classes along with quantitative classes in their major. The minor provides students with the statistical skills that will enable them to be involved in the design and analysis of quantitative studies in their field. The skills developed through these courses will be used in their professional careers or in pursuing graduate studies. It is increasingly necessary for practitioners in most disciplines to have a substantial background in statistics. Statistics plays a large role in many disciplines such as business, biology, ecology, economics, agriculture, etc. The minor is designed so that students will gain experience with quantitative methods which will complement their academic major and prepare them to take on more advanced quantitative tasks in their discipline. The proposed minor is excellent preparation for a graduate program or a career in which quantitative skills are required. These methods are useful for conducting research in applied subjects and students who complete this minor will be appealing to employees and graduate schools seeking individuals with quantitative skills.
 - B. Need for the proposed minor.

The proposed minor was created in response to students that were interested in a statistics minor but did not have the Calculus background required for our existing minor in Statistics. This minor is also in response to the increase emphasis that the university has placed on interdisciplinary studies. This minor is interdisciplinary in that it combines statistics with a student's other discipline. The conversations that took place across campus about the future academic plan focused attention on the need for more interdisciplinary studies. All the faculty/chairs that I have communicated with are supportive of this minor.

In addition, the proposed minor serves the critical need to adequately train students in statistical methods. The minor prepares students for the workforce as the minor enables students to demonstrate that they have quantitative skills. This will put them at a competitive advantage for quantitative jobs or graduate school. The minor will give students documentation that they have training in statistics rather than just taking some statistics classes here and there.

C. Identify other closely related curricula currently offered by the campus.

A minor in Statistics is currently offered and the majority of the students who complete this minor are math majors. The proposed minor is intended for non-math majors. Although there is some overlap between the two minors, the minor in Statistics has more math intensive requirements. The proposed minor focuses more heavily on statistics courses that do not have Calculus requirements and are more applied in nature.

1. Explain the impact the proposed minor will have on these programs.
The proposed minor should not have any impact on the minor in Statistics as they are serving different groups of students.
2. Explain how current programs do not meet the proposed minor's objectives.
The proposed minor will require more course work in applied statistics than the current minor in Statistics while require less classes that have a Calculus prerequisite. This minor will serve a different group of students than the current minor.

D. Student demand for the minor.

It is expected that between 10-15 students a year will be in the proposed program. This estimate comes from the current interest by students in this minor as well as from the enrollment numbers of students in similar programs at other universities.

V. Resources

A. List the faculty members for the required courses in the minor .

Name: *Kathy Gray*
Rank: *Associate Professor*
Appointment status: *Full time*
Highest degree earned: *PhD*
Date and Field of highest degree: *2007, Mathematics*
Professional experience: *Currently Associate Professor in Department of Mathematics and Statistics*

Name: *Nancy Carter*
Rank: *Professor*
Appointment status: *Full time*
Highest degree earned: *PhD*
Date and Field of highest degree: *1981, Statistics*
Professional experience: *Currently Professor in Department of Mathematics and Statistics*

B. Name: *Robin Jeffries*
Rank: *Assistant Professor*
Appointment status: *Full time*
Highest degree earned: *DrPH*
Date and Field of highest degree: *2013, Biostatistics*
Professional experience: *Currently Assistant Professor in Department of Mathematics and Statistics*

C. List the faculty members for the elective courses in the minor

Name: *Chris Ivey*
Rank: *Professor*
Appointment status: *Full time*
Highest degree earned: *PhD*

Name: *Randy Senock*
Rank: *Professor*
Appointment status: *Full time*
Highest degree earned: *PhD*

Name: *Anita Chaudhry*
Rank: *Associate Professor*
Appointment status: *Full time*
Highest degree earned: *PhD*

Name: *Lisa Ott*

Rank: *Associate Professor*
Appointment status: *Full time*
Highest degree earned: *PhD*

Name: *Dean Fairbanks*
Rank: *Professor*
Appointment status: *Full time*
Highest degree earned: *PhD*

Name: *Lawrence Herringer*
Rank: *Professor*
Appointment status: *Full time*
Highest degree earned: *PhD*

Name: *Eric Houk*
Rank: *Professor*
Appointment status: *Full time*
Highest degree earned: *PhD*

Name: *Cynthia Siemsen*
Rank: *Professor*
Appointment status: *Full time*
Highest degree earned: *PhD*

- D. List the resources needed to sustain the program for the first five years, including cost and funding source.
If the minor has between 10-15 students then there are few additional resources that will be needed to fund this minor over the next five years. The minor will increase the advising workload of statistics faculty. Additionally, enrollment numbers in the statistics classes will increase which will increase workload for faculty, however, in the first five years it is not expected that additional sections will need to be created due to this minor. It is not expected that enrollment will increase by significant numbers in any of the courses listed as electives.
- E. Additional support resources required, including source of support.
None

VI. Curriculum

Note: Proposed curriculum should take advantage of courses already offered in other departments when subject matter would otherwise overlap or duplicate existing course content.

- A. Total number of units required for the minor: *18 units*
- B. List all new courses for the proposed program.
No new courses are required for the proposed program.

C. List all required courses for the minor.

Choose 1 of the following:

Math 105-Statistics, 3 units, Pre-req: Completion of ELM requirement

Math 108-Statistics of Business and Econ, 3 units, Pre-req: For business administration students Math 107. For other students, completion of GE Pathway Foundation Quantitative Reasoning requirement.

3 required:

Math 315-Statistical Methods I, 3 units

Math 456-Statistical Methods II, 3 units, Pre-req: Math 315

Math 458-Sampling Methods, 3 units, Pre-req: 1 course from Math 105, Math 305, Math 350, or Math 315

List all elective courses for the minor.

At least 6 units of electives must be chosen from either the Department of Mathematics and Statistics or from another department. Electives must be courses with significant mathematical/statistical content as determined by faculty of the Department of Mathematics and Statistics. Prior approval is required to count Independent Study or Internships towards the Minor. Acceptable classes include:

ANTH 485-Formal Methods in Anthropology

ABUS 415-Agricultural Price Analysis

BIOL 408-Principles of Evolution

BSIS 610-Business Analytics

CSCI 217-Foundations of Computing

CHEM 320-Quantitative Analysis

CHEM 331-Physical Chemistry

ECON 380-Economic Statistics

ECON 481-Introductory Econometrics

ECON 483-Economic Forecasting

GEOG 315-Applied Statistical Methods in Geography

GEOG 405s-Nature of Restoration

GEOG 411-Geospatial Analysis and Modeling in GIS

GEOG 318-Remote Sensing of Environment

GEOG 444-Biogeography and Landscape Ecology

GEOS 440-Fundamentals in Environmental Science Instrumentation

MATH 109-Survey of Calculus **or** MATH 120-Analytic Geometry and Calculus

MATH 217-Discrete Mathematical Structures

MATH 314-Probability and Statistics for Science and Technology **or**

MATH 350-Introduction to Probability and Statistics

MKTG 380-Marketing Research

PSYC 364-Statistical Methods in Psychology

PSYC 560-Principles of Psychological Measurement

- SOCI 315-Statistical Analysis for the Social Sciences
- D. Explain provisions for articulation of the proposed minor with community college courses.
Math 105-Statistics is articulated with an equivalent course at the community college level.
- E. Complete catalog copy, including admission and completion requirements. See the current University Catalog for correct format; please follow it exactly. Before the proposal is submitted to Academic Affairs, it may be helpful to review catalog copy with Academic Publications.

Proposed Minor in Applied Statistics

Course Requirements for the Minor: 18 units

The following courses, or their approved transfer equivalents, are required of all candidates for this minor.

Lower-Division Courses: 3 units:

1 course selected from:

Math 105	Statistics	3.0	FS	GE
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Prerequisites: Completion of ELM requirement.

Math 108	Statistics of Business and Economics	3.0	FS	GE
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Prerequisites: For business administration students: MATH 107. For other students: completion of GE Pathway Foundation Quantitative Reasoning requirement.

Upper-Division Courses: 9 units

3 courses required:

Math 315	Applied Statistics Methods I	3.0	FS	
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Prerequisites: Completion of ELM requirement.

Math 456	Applied Statistical Methods II	3.0	S2	
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Prerequisites: Math 315

Math 458	Sampling Methods	3.0	S1	
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Prerequisites: One course chosen from Math 105, Math 305, Math 350, or Math 315

Electives: 6 units

At least 6 units of electives must be chosen from either the Department of Mathematics and Statistics or from another department. Electives must be courses with significant mathematical/statistical content as determined by faculty of the Department of Mathematics and Statistics. Prior approval is required to count Independent Study or Internships towards the Minor. Acceptable classes include:

ANTH 485-Formal Methods in Anthropology
ABUS 415-Agricultural Price Analysis
BIOL 408-Principles of Evolution
BSIS 610-Business Analytics
CSCI 217-Foundations of Computing
CHEM 320-Quantitative Analysis
CHEM 331-Physical Chemistry
ECON 380-Economic Statistics
ECON 481-Introductory Econometrics
ECON 483-Economic Forecasting
GEOG 315-Applied Statistical Methods in Geography
GEOG 405s-Nature of Restoration
GEOG 411-Geospatial Analysis and Modeling in GIS
GEOG 318-Remote Sensing of Environment
GEOG 444-Biogeography and Landscape Ecology
GEOS 440-Fundamentals in Environmental Science Instrumentation
MATH 109-Survey of Calculus **or** MATH 120-Analytic Geometry and
Calculus
MATH 217-Discrete Mathematical Structures
MATH 314-Probability and Statistics for Science and Technology **or**
MATH 350-Introduction to Probability and Statistics
MKTG 380-Marketing Research
PSYC 364-Statistical Methods in Psychology
PSYC 560-Principles of Psychological Measurement
SOC 315-Statistical Analysis for the Social Sciences

Attach the New Minor signature form to the front of the proposal and submit to Academic Affairs after all department and college reviews are complete.

Appendix:

The appendix includes the student learning outcomes for this program as well as a plan for program assessment.

Program Mission and Goals:

The main objective of the minor in applied statistics is to offer students a modern applied statistics program that provides students with a foundation in statistics that will lead to professional success. Students will be expected to learn a variety of statistical methods and be able to work with data. Students should understand statistical reasoning, statistical computing, statistical modeling, and have the skills to apply statistical methods to data.

Student Learning Objectives (SLO):

Through the required and elective classes, students will be able to do the following:

SLO #1-Have the skills to design studies and to collect, analyze, and interpret data

SLO #2-Conduct an exploratory analysis of data by graphical and other means

SLO#3-Understand that statistical concepts can be applied to many fields

SLO#4-Use and apply a wide variety of statistical methods

SLO#5-Demonstrate proficiency in using statistical software for data analysis

SLO#6-Communicate results of statistical analysis both orally and in writing

Assessment plan:

The following table gives the courses in which the above student learning objectives can be assessed.

Student Learning Outcome	Courses to assess
SLO#1	Math 315 and Math 458
SLO#2	Math 105 and Math 315
SLO#3	Elective courses, Math 315, 456, 458
SLO#4	Math 315, Math 456, Math 458, elective courses
SLO#5	Math 315 and Math 456
SLO#6	Math 315 and Math 456

A program assessment report will be completed in consultation with Academic Affairs. Each report will assess a subset of learning objectives stated above. A course alignment matrix will be included in the assessment report. A rubric to assess the learning objective will be included in the report. Other sections included in the report will be: analysis of data and interpretation of results, planned program improvement, planned revision of measures, and planned revision to learning outcomes. Faculty will consult with Academic Affairs to determine the frequency of program assessment.

