Division of Academic Affairs **Policy Number:** SP.14.03
Approved By: Academic Senate **Effective Date:** August 19, 2015
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Statistics and Data Analytics Minor

PROGRAM IDENTIFICATION

NAME OF THE MINOR
Statistics and Data Analytics

ACADEMIC PROGRAM PROPOSING THE MINOR
Mathematics

PROGRAM DESCRIPTION

DESCRIPTION OF THE MINOR AND STUDENT LEARNING OUTCOMES
Students will study statistical techniques and solve problems by analyzing data collected from various sources. This minor will provide students with computer software practices and real life experience with quantitative methods, statistical modeling and big data analysis. By choosing electives across disciplines, students will gain a broad perspective by applying statistical methods to an ever increasing volume and detail of information captured from various sources and enterprises, such as multimedia, social media and the Internet.

HOW THE MINOR SUPPORTS THE UNIVERSITY'S MISSION AND STRATEGIC GOALS
Statistics has broad applications as its methods apply to data collected in all areas of human endeavors. Additionally, students in this minor will choose complementary electives from various fields where statistical methods are applied (such as Political Science, Psychology, Sociology, Physics, and Computer Sciences). The minor facilitates and supports applications across disciplines and integrative approaches.

PROVIDE A CATALOG DESCRIPTION OF THE MINOR (include a program description, careers associated with the minor, and faculty names and titles)
Students in this minor will study modern techniques for analyzing, mining, reducing and describing statistically various data from variety of sources. Students will use computer software to apply quantitative methods, statistical modeling and analysis to an ever increasing volume and detail of information captured by various sources and enterprises, such as multimedia, social media and the Internet. Students will understand not only how to produce statistics and analytics, but also how to make better decisions based on that analysis.

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Careers

The demand for professionals with skills to organize and analyze data and to apply advanced statistical methods and related technology is steadily increasing. Students with various majors completing the minor will receive an excellent preparation for securing professional positions as analysts and statisticians in sciences, businesses, insurance companies, military and data collecting industries and public sector.

Jorge Garcia – Associate Professor of Mathematics
Ivona Grzegorczyk – Professor of Mathematics
Kathryn Leonard – Associate Professor of Mathematics
Cindy Wyels –Professor of Mathematics

CURRICULUM

(a) Lower and Upper Division Course Requirements (including pre- and co- requisites.) Identify required elective courses. Identify currently available course in the catalog, and separately identify newly developed courses.

Minor in Statistics and Data Analytics (24 units)

REQUIRED

Lower Division Requirements (3):

- COMP 105 Introduction to programming or higher or IT 151 IT Programming
- MATH 240 Linear Algebra (3)

Upper Division Requirements (6):

- MATH 398 Statistical Modeling and Data Visualization (3) – NEW COURSE – see description below
- MATH 408 Advanced Data Analysis (3) – NEW COURSE – see description below or COMP 478 Data Mining

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ELECTIVES

At least three (3) electives must be taken at the upper-division (300 or 400) level

Three (3) Units from list below:

- MATH 230 Logic (3)
- MATH 300 Discrete Mathematics (3)
- MATH 301 Discrete Mathematics for IT (3)

Three (3) Units from:

- MATH 201 Elementary Statistics (3)
- MATH 202 Biostatistics (3)
- MATH 329 Statistics for Business and Economics (3)
- MATH 352 Probability and Statistics (3)

Complementary electives (6) Units from:

- BIOL 453 Methods in Population and Community Ecology
- COMP 151 Data Structures and Program Design
- COMP 469 Artificial Intelligence/Neural Nets
- COMP 478, Introduction to Data Mining
- ECON 488 Econometrics
- MATH 429 Operations research (3)
- MATH 430 Research Design and Data (3)
- MATH/COMP 452 Computational Bioinformatics
- MATH/PHYS 445
- POLS 303 Statistical Applications in the Social Sciences (SOC/PSY) (3)*
- PSY 300 - Psychological Research and Statistical Methods I (3)*
- PSY 301 - Psychological Research and Statistical Methods II (3)
- ESRM 328: Introduction to Geographical Information Systems
- *Only one of POLS303 or PSY300 may count toward the minor.

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(b) Total number of units in the Minor (including pre- and co-requisites)

24 units; please note that depending on the courses chosen, the unit count may go up to 28 with pre- and co-requisites

New courses – catalog descriptions (all approved 2013-14):

MATH 398 Statistical Modeling and Data Visualization
Prerequisite: Statistics course
Pre- or Co requisite MATH 240 Linear Algebra

Description. Introduction to statistical modeling and quantitative analysis. Applications of variable types, study types, distributions, data organization, database creation, linear regression, data modeling and visualization techniques to answer a real world research question. Moderate programming skills in an appropriate statistical software.

MATH 408 Advanced Data Analysis
Prerequisite: MATH 398

Description. Introduction to data management and analytics. Bayesian methods, multivariate data, multivariate normal distribution, multivariate regression, principal components, factor, canonical correlation, discriminant analyses, and clustering.
Extensive use of appropriate statistical and programming software.

ACADEMIC STRUCTURE AND ENROLLMENT

(a) Identify the program area and persons responsible for program management and oversight.

Mathematics: Kathryn Leonard, Ivona Grzegorczyk, Jorge Garcia, Cindy Wyels

(b) Estimate number of students enrolling in the minor in the initial year, and after three (3)

and five (5) years.

	Number of Students in the Minor
Initiation Year:	5
Third Year:	15
Fifth Year:	30

FACULTY AND STAFF RESOURCES

(a) Existing faculty and staff qualified to each in and support the minor, including the percent of their work assignment contributing to the minor

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Cindy Wyels
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Note: this minor will be administered by the mathematics program and will offer one new course per semester, probably team-taught, and other courses can be double counted in various majors. Therefore it is hard to say what is the specific percentage of faculty work assignment towards this major, and the workload for mathematics faculty will be included in their regular workload. Here are our best estimates at this time: Jorge Garcia (10%), Kathryn Leonard (10%), Ivona Grzegorczyk (3%), Cindy Wyels (3%).

(b) Additional faculty and staff needed for the minor and the areas of expertise needed.

Some part-time faculty with statistical and programming experience working with large data bases in various industries (such as health, business, military, insurance, research institutions) maybe required for the advanced computer based statistical methods.

FACILITIES, EQUIPMENT, FINANCIAL AND INFORMATION RESOURCES

(a) Existing facilities, equipment, and information resources available to support the minor.

Existing computer labs with the following software: Excel, R. Python, SPSS, mySOL or other databases; most of the software is already used on our campus at various departments; new software may be needed with time.

(b) External funding already in progress or anticipated

None

(c) Facilities, Equipment, and Information Resources Needed to Support the Minor

None