BS IN STATISTICS

In Workflow

1. MATH Committee Chair (vincent.pigno@csus.edu)
2. MATH Chair (kelce@skymail.csus.edu)
3. NSM College Committee Chair (mikkel.jensen@csus.edu)
4. NSM Dean (datwyler@csus.edu)
5. Academic Services (catalog@csus.edu)
6. Senate Curriculum Subcommittee Chair (curriculum@csus.edu)
7. Faculty Senate Executive Committee Chair (kathy.honeychurch@csus.edu)
8. Faculty Senate Chair (kathy.honeychurch@csus.edu)
9. Dean of Undergraduate (gardner@csus.edu)
10. Dean of Graduate (cnewsome@skymail.csus.edu)
11. President (210748526@csus.edu)
12. Provost (amy.wallace@csus.edu; minekh@csus.edu)
13. Chancellor's Office (catalog@csus.edu)
14. Board of Trustees (torsetj@csus.edu)
15. WASC (amy.wallace@csus.edu)
16. Catalog Editor (catalog@csus.edu)
17. Registrar's Office (k.mcfarland@csus.edu)

Approval Path

1. Fri, 13 Oct 2023 14:44:34 GMT
   Vincent Pigno (vincent.pigno): Approved for MATH Committee Chair
2. Fri, 13 Oct 2023 15:26:46 GMT
   Kimberly Elce (kelce): Approved for MATH Chair
3. Wed, 18 Oct 2023 22:55:56 GMT
   Mikkel Jensen (mikkel.jensen): Rollback to MATH Chair for NSM College Committee Chair
4. Thu, 19 Oct 2023 19:51:37 GMT
   Kimberly Elce (kelce): Approved for MATH Chair
5. Thu, 19 Oct 2023 20:24:03 GMT
   Mikkel Jensen (mikkel.jensen): Approved for NSM College Committee Chair
6. Fri, 20 Oct 2023 23:09:25 GMT
   Shannon Datwyler (datwyler): Approved for NSM Dean
7. Thu, 02 Nov 2023 23:07:33 GMT
   Katie Hawke (katiedickson): Approved for Academic Services

New Program Proposal

Date Submitted: Fri, 13 Oct 2023 03:26:23 GMT

Viewing: BS in Statistics

Last edit: Thu, 19 Oct 2023 19:46:12 GMT

Changes proposed by: Kimberly Elce (101052896)

Academic Group: (College)

Natural Sciences & Mathematics

Academic Organization: (Department)

Mathematics & Statistics

Catalog Year Effective:

2024-2025 Catalog

NOTE: This degree major program will be subject to program review evaluation within six years after implementation.

Individual(s) primarily responsible for drafting the proposed degree major program:

Name (First Last)	Email	Phone 999-999-9999
Clark Fitzgerald	fitzgerald@csus.edu	916-278-4748
Coskun Cetin	cetin@csus.edu	916-278-4301
Rafael Diaz	rdiaz@csus.edu	916-278-6588
Santosh Kandel	kandel@csus.edu	916-278-8437
Jas Pannu	j.pannu@csus.edu	916-278-4747
Lauren Perry	perry@csus.edu	916-278-4348
Michelle Norris	norris@csus.edu	916-278-4300

Type of Program Proposal:

Major

Is this a pilot program?

No

Delivery Format:

Fully Face to Face

Does this major plan to include any formal options, concentrations, or special emphases?

Yes

Fully explain the formal options, concentrations, or special emphases:

All statistics majors will choose one of three emphases for more specialized coursework: mathematical statistics, applied statistics, or data science. Each emphasis requires 9 units of courses, which are described precisely in the Catalog Description below.

The emphasis in mathematical statistics prepares students for graduate study in statistics by requiring courses in intro to proofs (Math 108), analysis (Math 130A), and one more course at an appropriate mathematical level. This is consistent with the curricular recommendations of the American Statistical Association for students who wish to pursue a PhD in Statistics.

The emphasis in applied statistics is versatile, allowing students to tailor the degree to their interests by working with a major advisor to choose appropriate upper division elective courses from across campus. For example, a statistics major interested in physics could fulfill their emphasis requirements by taking 2 upper division physics courses in modern physics and statistical mechanics, plus numerical analysis (Math 150).

The emphasis in data science includes additional instruction in computing to prepare graduates for careers in technology. Students choosing this emphasis must take Stat 129, Big Data, which means that every student who graduates with this emphasis will have demonstrated proficiency in the most popular programming languages for data science: R, Python, bash, and SQL. These skills will qualify them for jobs in data science immediately after graduation.

Title of the Program:

BS in Statistics

Designation: (degree terminology)

Bachelor of Science

Abstract of the proposal:

Statistics is the science and art of creating meaning from data. The statistics bachelor's degree provides students with a solid foundation in the theory, methods, and applications of statistical analysis. Students will analyze real world data sets, model complex phenomena, use professional software, and produce a portfolio of meaningful projects. Graduates will have the skills and knowledge needed to excel in a data-driven world.

Briefly describe the program proposal (new or change) and provide a justification:

The new Statistics BS is designed to produce well rounded graduates who excel at working with real data. All statistics majors will study a rigorous core curriculum and choose an emphasis for more specialized coursework. The core curriculum includes probability, mathematical statistics, computing, linear models, machine learning, and culminates in a semester-long capstone project. The emphasis options are described elsewhere in this form.

The Mathematics and Statistics Department currently offers a minor in statistics, and this proposal is in response to increasing student demand. Data science is a growing field, and this program will provide opportunity to CSU students who wouldn't otherwise have access to a statistics major outside of the Bay Area.

University Learning Goals

Undergraduate Learning Goals:

Competence in the disciplines
Knowledge of human cultures and the physical and natural world
Intellectual and practical skills
Personal and social responsibility
Integrative learning

Program Learning Outcomes

Program Learning Outcomes

Learning Outcome
Apply fundamental techniques of mathematical statistics by solving problems in probability, estimation, and inference
Communicate statistical results in written reports using professional technology, data visualizations, or mathematical arguments
Communicate statistical results in oral presentations using professional technology and data visualizations
Critically evaluate raw data and transform it into a form that's appropriate for statistical analysis using professional technology
Find, evaluate, and use appropriate data sets to augment and improve data analyses
Apply a broad set of standard statistical techniques and methods, interpret the results in context, and identify their limitations
Apply statistical knowledge to solve societal problems, address real needs and make positive contributions to underserved communities, schools and non-profits

Will this program be required as part of a teaching credential program, a single subject, or multiple subject waiver program (e.g., Liberal Studies, Biology) or other school personnel preparation program (e.g., School of Nursing)?

No

Please attach a Comprehensive Program Assessment Plan (required)

stats-program-assessment.xlsx

Please attach a Curriculum Map Matrix (required)

Statistics-BS-curriculum-map-matrix.xlsx

Please attach a five-year budget projection (required)

5-year-budget.xlsx

Please attach the Smart Planner roadmap:

statistics-roadmap.pdf
statistics-roadmap.docx

Catalog Description:

Units required for Major: 49-50, includes units of study in chosen emphasis (see below).
Total units required for BS: 120

Program Description

Statistics is the science and art of creating meaning from data. The statistics bachelor's degree provides students with a solid foundation in the theory, methods, and applications of statistical analysis. Students will analyze real world data sets, model complex phenomena, use professional software, and produce a portfolio of meaningful projects. Graduates will have the skills and knowledge needed to excel in a data-driven world.

All statistics majors will study a rigorous core curriculum and choose an emphasis for more specialized coursework. The core curriculum includes probability, mathematical statistics, computing, linear models, machine learning, and culminates in a semester-long capstone project. The emphasis in **mathematical statistics** prepares students for graduate study in statistics. The emphasis in **applied statistics** is versatile, allowing students to tailor the degree to their interests. The emphasis in **data science** includes additional instruction in computing to prepare graduates for careers in technology.

Program Requirements: (If new courses are being created as part of a new program, it will be useful to propose courses first.)

Program Requirements

Code	Title	Units
Lower Division Core Courses (21-22 Units)		
MATH 30	Calculus I	4
MATH 31	Calculus II	4
MATH 32	Calculus III	4
MATH 35	Introduction to Linear Algebra	3
Select one of the following:		3
MATH 64	Mathematical Programming	
CSC 10	Introduction to Programming Logic	
CSC 15	Programming Concepts and Methodology I	
CSC 22	Visual Programming in BASIC	
CSC 25	Introduction to C Programming	
STAT 50	Introduction to Probability and Statistics	3 - 4
or STAT 1	Introduction to Statistics	
Upper Division Core Courses (19 Units)		
STAT 115A	Introduction to Probability Theory	3
STAT 115B	Introduction to Mathematical Statistics	3
STAT 128	Statistical Computing	3
STAT 140A	Course STAT 140A Not Found	3
STAT 140B	Course STAT 140B Not Found	3
STAT 191	Course STAT 191 Not Found	1
STAT 192	Course STAT 192 Not Found	3
Additional Requirements for Specialized Study (9 Units)		
Select an emphasis from the following three options:		9
Emphasis in Applied Statistics		
Emphasis in Data Science		
Emphasis in Mathematical Statistics		
Total Units		**49-50**

Emphasis in Applied Statistics

Code	Title	Units
Select three of the following:		9
MATH 101	Combinatorics	
MATH 108	Introduction to Formal Mathematics	
MATH 117	Linear Algebra	
MATH 150	Introduction to Numerical Analysis	
MATH 170	Linear Programming	
STAT 129	Analyzing and Processing Big Data	
STAT 155	Introduction to Techniques of Operations Research	
Course approved by statistics major advisor		
Total Units		**9**

Emphasis in Data Science

Code	Title	Units
STAT 129	Analyzing and Processing Big Data	3
Select two of the following:		6
STAT 155	Introduction to Techniques of Operations Research	
MATH 108	Introduction to Formal Mathematics	
MATH 150	Introduction to Numerical Analysis	
MATH 170	Linear Programming	
Course approved by statistics major advisor		
Total Units		**9**

Emphasis in Mathematical Statistics

Code	Title	Units
MATH 108	Introduction to Formal Mathematics	3
MATH 130A	Functions of a Real Variable	3
Select one of the following:		3
MATH 110A	Modern Algebra	
MATH 117	Linear Algebra	
MATH 130B	Functions of a Real Variable	
Total Units		**9**

Explanation of special characteristics of the proposed degree major program; e.g., in terminology, units of credit required, types of course work, etc.:

na

For undergraduate programs, provisions for articulation of the proposed major with community college programs:

Much of the lower division coursework can be completed at community colleges holding articulation agreements with Sacramento State. For example, Math 30, 31, 32, 35, Stat 1.

Will this program require specialized accreditation?

Will this program require accreditation?

No

Need for the Proposed Degree Major Program

Is the proposed degree program offerred at any California State University campus or any neighboring institutions?

Yes

List of other California State University campuses currently offering or projecting the proposed degree major program; list of neighboring institutions, public and private, current offering the proposed degree major program:

California State University campuses currently offering a BA or BS in Statistics include East Bay, Humboldt, Long Beach, Monterey Bay, San Diego, San Francisco, San Jose, San Luis Obispo, Sonoma.

UC Davis is the only neighboring institution that currently offers a BA or BS in Statistics.

Differences between the proposed program and the programs listed above:

Unique to the program and location in Sacramento, California's capital, this program will offer opportunities through coursework to work on projects with local organizations that include state agencies.

List of other curricula currently offered by Sac State which are closely related to the proposed program:

The Mathematics and Statistics Department offers a Minor in Statistics, and a Major in Mathematics with an Emphasis in Statistics. The Statistics BS grew directly from these programs.

The College of Business offers a Master of Science in Business Analytics.

Attach the results of a formal survey in the geographical area to be served indicating demand for individuals who have earned the proposed degree and evidence of serious student interest in majoring in the proposed program:

demand-statistics-program.docx

For graduate programs, the number of declared undergraduate major and the degree production over the preceding years of the corresponding baccalaureate program:

na

Professional uses of the proposed degree major program:

This is a data-driven world, and program graduates can find jobs as statisticians, data analysts, or data scientists in a wide range of settings including private companies, academia, and government.

The expected number of majors in:

1st Year Enrollment:

20

3rd Year Enrollment:
53
5th Year Enrollment:
91

1st Year Graduates:
0
3rd Year Graduates:
12
5th Year Graduates:
23

Existing Support Resources for the Proposed Degree Major Program

List faculty members, with rank, appointment status, highest degree earned, date and field of highest degree, and professional experience (including publications if the proposal is for a graduate degree), who would teach in the proposed program:

Name	Rank	Appointment Status	Highest Degree Earned	Year of Highest Degree Earned (YYYY)	Publications/Professional Experience
Coskun Cetin	Professor	Full Time	Doctorate	2004	Research is in the area of applied mathematics and statistics. Has been teaching all levels of statistics in the department since 2006.
Rafael Diaz	Professor	Full Time	Doctorate	2006	Research is in the area of applied mathematics and statistics. Has been teaching all levels of statistics in the department since 2007.
Clark Fitzgerald	Assistant Professor	Full Time	Doctorate	2020	Research is in the area of statistics. Has developed and taught statistics courses in the department.
Santosh Kandel	Assistant Professor	Full Time	Doctorate	2014	Research is in the area of applied mathematics and statistics. Has taught statistics courses in the department.
Jas Pannu	Assistant Professor	Full Time	Doctorate	2105	Research is in the area of statistics and statistics education. Has developed and taught statistics courses in the department.
Lauren Perry	Assistant Professor	Full Time	Doctorate	2020	Research is in the area of statistics and statistics education. Has developed and taught statistics courses in the department.

Space and facilities that would be used in support of the proposed program: Show how this space is currently used and what alternate arrangements, if any, will be made for the current occupants.
Current classroom space is adequate.

Library resources to support the program, specified by subject areas, volume count, periodical holdings, etc.:
Existing library resources are sufficient.

Equipment and other specialized materials currently available:
na

Reviewer Comments:
Mikkel Jensen (mikkel.jensen) (Wed, 18 Oct 2023 22:55:56 GMT): Rollback: Reformatting of program requirements.

Key: 554