ACADEMIC SENATE
Of
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo, CA

AS-937-22

RESOLUTION ON NEW DEGREE PROGRAM FOR MASTERS OF SCIENCE IN STATISTICS

1	WHEREAS,	For nearly 50 years the Statistics Department has offered a BS Statistics
2		degree and, in 1973 was among the first programs in the nation to offer an
3		undergraduate degree in statistics; and
4		
5	WHEREAS,	Demand for statisticians with advanced degrees vastly outstrips supply, both
6		in California and nationwide; and
7		
8	WHEREAS,	Cal Poly's Academic Plan Consultative Committee reviewed the summary
9		statement for the new Master of Science in Statistics degree; and
10		
11	WHEREAS,	Both the Cal Poly Provost and the CSU Board of Trustees approved the
12		addition of the new Master of Science in Statistics degree to Cal Poly's
13		academic plan; and
14		
15	WHEREAS,	The department developed a new degree program proposal (see attached)
16		using the template required by the Chancellor's Office; and
17		
18	WHEREAS,	This new degree program proposal has been approved by the Statistics
19		department curriculum committee, the College of Science and Mathematics
20		curriculum committee, and the Academic Senate Curriculum Committee;
21		therefore be it
22		
23	RESOLVED:	That the Academic Senate of Cal Poly approves the new degree program for
24		final review by the Chancellor's Office.

Proposed by: Andrew Schaffner, Kelly
Bodwin, and John Walker
on behalf of the Statistics Department
Faculty
Date: March 29, 2022

NEW DEGREE PROPOSAL

Master of Science in Statistics

March 2022

<div style="border: 1px solid red;">

CSU DEGREE PROPOSAL: MS Statistics
Faculty Check List
(please submit with program proposal)

</div>

Please confirm (√) that the following are included in the degree proposal:

__√__ **Board of Trustees Academic Master Plan approval date**

__√__ **WSCUC response to Substantive Change Screening Form is attached**

_N/A_ **Copies of any contracts or agreements made between parties with an interest in operating the proposed program.** Other entities may include academic departments, academic institutions, foundations, vendors or similar. Please include a copy of the agreement and an e-mail or other evidence that the campus attorney has approved the agreement.

__√__ **The total number of units required for graduation is specified (not just the total for the major):**

　　_N/A_ a proposed bachelor's program requires no fewer than 120 semester units

　　_N/A_ **any** proposed bachelor's degree program with requirements exceeding 120 units must request an exception to the 120 semester unit limit policy

　　__√__ **all** units required for degree completion must be included in the total units required for the degree. Any proficiencies required to graduate that are beyond what is included in university criteria admission criteria must be assigned unit values and included in the total unit count.

_N/A_ **Title 5 minimum requirements for bachelor's degree have been met, including:**

　　_N/A_ minimum number of units in major (BA 24 semester units, BS 36 semester units)

　　_N/A_ minimum number of units in upper-division (BA 12 semester units, BS 18 semester units)

__√__ **Title 5 requirements for proposed master's degree have been met, including:**

　　__√__ minimum of 30 semester units of approved graduate work are required

　　__√__ no more than 50% of required units are organized primarily for undergraduate students

　　__√__ maximum of 6 semester units are allowed for thesis or project

　　__√__ Title 5 requirements for master's degree culminating experience are clearly explained.

　　__√__ for graduate programs, at least five full-time faculty with terminal degrees in appropriate disciplines are on staff.

_N/A_ **For self-support programs:**
　　(in conformance with EO 1099 and EO 1102)

_N/A_ specification of how all required EO 1099 self-support criteria are met

_N/A_ the proposed program does not replace existing state-support courses or programs

_N/A_ academic standards associated with all aspects of such offerings are identical to those of comparable state-supported CSU instructional programs

_N/A_ explanation of why state funds are either inappropriate or unavailable

_N/A_ a cost-recovery program budget is included*

_N/A_ student per-unit cost is specified

_N/A_ total cost for students to complete the program is specified

* Basic Cost Recovery Budget Elements
(Three to five year budget projection)

Student per-unit cost
Number of units producing revenue each academic year
Total cost a student will pay to complete the program

Revenue - (yearly projection over three years for a two-year program; five years for a four-year program)
      Student fees
      Include projected attrition numbers each year
      Any additional revenue sources (e.g., grants)

Direct Expenses
      Instructional costs – faculty salaries and benefits
      Operational costs – (e.g., facility rental)
      Extended Education costs – staff, recruitment, marketing, etc.
      Technology development and ongoing support (online programs)

Indirect Expenses
      Campus partners
      Campus reimbursement general fund
      Extended Education overhead
      Chancellor's Office overhead

*Additional line items maybe added based on program characteristics and needs.

1. **Program Type**

    a. State-Support

    c. Delivery Format: Fully face to face

    e. New Program

2. **Program Identification**

    a. *Campus:*

    California Polytechnic State University, San Luis Obispo

    b. *Full and exact degree designation and title:*

    Master of Science in Statistics

    c. *Date the Board of Trustees approved adding this program projection to the campus Academic Master Plan:*

    March 24, 2020

    d. *Term and academic year of intended implementation:*

    Fall 2023

    e. *Total number of units required for graduation. This will include all requirements (and campus-specific graduation requirements), not just major requirements:*

    45 quarter units

    f. *Name of the department(s), division, or other unit of the campus that would offer the proposed degree major program. Please identify the unit that will have primary responsibility.*

    Department of Statistics, College of Science and Math

    g. *Name, title, and rank of the individual(s) primarily responsible for drafting the proposed degree major program.*

    Dr. Andrew Schaffner, Professor (aschaffn@calpoly.edu)
    Dr. Kelly Bodwin, Assistant Professor (kbodwin@calpoly.edu)
    Dr. John Walker, Professor (jwalker@calpoly.edu)
    Dr. Dennis Sun, Assistant Professor (dsun09@calpoly.edu)

h. *Statement from the appropriate campus administrative authority that the addition of this program supports the campus mission and will not impede the successful operation and growth of existing academic programs.*

> See: Supplement 4: Dean's Office Letter of Support
>   Supplement 6: New Tenure-Track Search Approval.

i. *Any other campus approval documents that may apply (e.g. curriculum committee approvals).*

> See Supplement 1:
> (a) Statistics Department Curriculum Committee approval
> (b) College of Science and Math Curriculum Committee approval and Academic Senate Curriculum Committee approval
> (c) Academic Senate Resolution
> (d) Presidential approval

j. Substantive Change:
The WASC Senior College and University Commission Substantive Change Manual states: **Institutions must submit a Substantive Change Screening Form for all new degree programs to determine if a review is necessary.** *Please include a copy of the response to the Substantive Change Screening form.*

If this proposed program is subject to WSCUC Substantive Change review, the campus may submit a copy of the WSCUC Sub-Change proposal in lieu of this CSU proposal format. If campuses choose to submit the WSCUC Substantive Change Proposal, they will also be required to submit a program assessment plan using the format found in the CSU program proposal template.

The proposed program was submitted for a substantive change screening. WSCUC determined that the program was not subject to WSCUC Substantive Change Review.

See Supplement 7: WSCUC Response to Substantive Change Screening

k. *Proposed Classification of Instructional Programs and CSU Degree Program Code*

Although the Chancellor's Office assigns CIP Codes, campuses are invited to suggest one CSU degree program code and one corresponding CIP code. If an appropriate CSU code does not appear on the system-wide list at: http://www.calstate.edu/app/resources.shtml you can search CIP 2020 at http://nces.ed.gov/ipeds/cipcode/ to identify the code that best matches the proposed degree program. The Classification of Instructional Programs (CIP) is a National Center for Education Statistics (NCES) publication that provides a numerical classification and standard terminology for secondary and postsecondary instructional programs. The CSU degree program code (based on old HEGIS codes) and CIP code will be assigned when the program is approved by the Chancellor.

27.0501 (Statistics – General)

3. Program Overview and Rationale

a. Provide a brief descriptive overview of the program citing its 1) purpose and strengths, 2) fit with the institutional mission or institutional learning outcomes, and 3) the compelling reasons for offering the program at this time.

The purpose of the Masters of Science in Statistics program is to provide advanced training to students preparing for careers in statistics and data analysis. The proposed program consists of advanced coursework that lays conceptual and methodological foundations, as well as applied skills such as statistical computing. The degree also includes a significant amount of independent research, including consulting with external clients and collaborating on interdisciplinary projects across campus. This is a unique program that fits Cal Poly's "Learn by Doing" mission, giving students hands-on experience with applying statistical theory to real problems. Students will be partners with faculty in building cross-campus, interdisciplinary collaborations, which will benefit both students and faculty---not just in the Statistics department but across the entire university.

One notable strength of the proposed program is the faculty. The Statistics Department at Cal Poly is renowned nationally: faculty regularly publish work and present at major conferences, and four of our faculty members have been elected Fellows of the American Statistical Association. It is one of only two standalone Statistics departments in the CSU, with 20 tenure-track faculty members whose training, research, and expertise is specifically in statistics and data analysis. Thus, we are well-positioned to train students for the growing number of jobs in these areas.

In 2019, the College of Science and Math contracted Hanover Research to conduct market research based on our preliminary proposal for a Masters program. It found that the demand in the job market for statisticians with advanced degrees vastly outstrips the supply, both in California and nationwide. The gap is projected to widen over the next 10 years. Hanover Research concluded that the market was highly favorable for a Masters program like ours.

Although the Statistics Department already offers an undergraduate degree in Statistics and a cross-disciplinary studies minor in Data Science, many data-driven jobs now require advanced degrees. Our proposed Master's program would equip students with the skills and qualifications necessary to step directly into high-level data analysis jobs. This opportunity would greatly benefit current undergraduates at Cal Poly, as well as provide an option for students in the Central Coast region who completed their undergraduate degree elsewhere.

b. Provide the proposed catalog description. The description should include:

i. *a narrative description of the program*

The Masters of Science in Statistics program is designed to provide advanced training to students preparing for careers in statistics and data analysis. The program consists of coursework that lays the conceptual and methodological foundations of the discipline, as well as consulting and research experiences.

The program is intended for students with an undergraduate major or minor degree in Statistics. It requires completion of a core curriculum (covering theory and applications), a thesis, and directed electives for a total of 45 units.

ii. admission requirements:

All students must have taken the equivalent of :
MATH 206 (linear algebra),
MATH 241 (multivariable calculus),
CSC 101 (introductory computer science), and
STAT 302 (second course in statistics).

In addition, students are expected to have taken the equivalent of:
STAT 323 (design of experiments)
STAT 331 (statistical computing in R)
STAT 334 (applied linear models)
Students without these courses may be admitted conditionally, taking up to 12 units (not applicable to the degree) in these areas to make up for any deficiencies.

iii. a list of all required courses for graduation including electives, specifying course catalog numbers, course titles, prerequisites or co-requisites (ensuring there are no "hidden prerequisites" that would drive the total units required to graduate beyond the total reported in 2e above), course unit requirements, and any units associated with demonstration of proficiency beyond what is included in university admission criteria

- Core Courses (37 units)*
    - STAT 425: Probability Theory (4 units)
      Prerequisites: MATH 206, MATH 241, STAT 302
      (all admissions requirements)
    - STAT 426: Estimation and Sampling Theory (4 units)
      Prerequisites: STAT 425
    - STAT 427: Mathematical Statistics (4 units)
      Prerequisites: STAT 426
    - STAT 466: Statistical Consulting (4 units)
      Prerequisites: STAT 323, STAT 334
    - STAT 550: Generalized Linear Models (4 units)
      Prerequisites: STAT 334, STAT 427
    - STAT 551: Statistical Learning with R (4 units)
      Prerequisites: STAT 331 or 531, STAT 334, STAT 305 or STAT 350
    - STAT 566: Graduate Consulting Practicum (2 units)
      Prerequisites: STAT 466
    - STAT 590: Graduate Seminar (3 units)
    - STAT 599: Thesis (8 units)

- Elective Courses (8 units)
    - STAT 541: Advanced Statistical Computing with R (4 units)
      Prerequisites: STAT 331, STAT 334, STAT 426

- ○ STAT 543: Advanced Design and Analysis of Experiments (4 units)
  Prerequisites: STAT 323 or 523, STAT 334 or 534
- ○ STAT 545: Applied Stochastic Processes (4 units)
  Prerequisites: MATH 206 or MATH 244, STAT 426
- ○ STAT 500: Independent Study (1-4 units)
  Prerequisites: Consent of graduate advisor

- ○ CSC 566: Topics in Advanced Data Mining (4 units)
  Prerequisites: CSC 466
- ○ CSC 582: Introduction to Natural Language Processing (4 units)
  Prerequisites: CSC 466
- ○ MATH 550: Real Analysis (4 units)
  Prerequisites: Consent of instructor

- Prerequisite Courses (0-12 units, depending on student background)
  - ○ STAT 323: Design and Analysis of Experiments I (4 units)
  - ○ STAT 331: Statistical Computing with R (4 units)
  - ○ STAT 334: Applied Linear Models (4 units)

* Students who complete 400-level Core Courses as part of their Bachelor's Degree or Minor Degree may substitute any 500-level elective course, or any approved 400-level elective course. (See Supplement 2: Approved Electives for a list of approved courses.)

iv. total units required to complete the degree:

45

v. if a master's degree, catalog copy describing the culminating experience requirement(s)

This degree culminates in completion of a thesis, which gives students experience in completing an original research project. The findings of this thesis should be of a quality commensurate with publication in a peer-reviewed scientific journal.

4. Curriculum

(These requirements conform to the revised 2013 WASC Handbook of Accreditation)

a. *These program proposal elements are required:*

- • *Institutional learning outcomes (ILOs)*
- • *Program learning outcomes (PLOs)*
- • *Student learning outcomes (SLOs)*

Describe outcomes for the 1) institution, 2) program, and for 3) student learning. Institutional learning outcomes (ILOs) typically highlight the general knowledge, skills, and dispositions all students are expected to have upon graduating from an institution of higher learning. Program learning outcomes (PLOs) highlight the knowledge, skills, and dispositions students are expected to know as graduates from a specific program. PLOs are more narrowly focused than

ILOs. Student learning outcomes (SLOs) clearly convey the specific and measureable knowledge, skills, and/or behaviors expected and guide the type of assessments to be used to determine if the desired the level of learning has been achieved.

(WASC 2013 CFR: 1.1, 1.2, 2.3)

Institutional Learning Outcomes:

When students graduate from Cal Poly, they should be able to:
1. Think critically and creatively
2. Communicate effectively
3. Demonstrate expertise in a scholarly discipline and understand that discipline in relation to the larger world of the arts, sciences, and technology
4. Work productively as individuals and in groups
5. Use their knowledge and skills to make a positive contribution to society
6. Make reasoned decisions based on an understanding of ethics, respect for diversity, and awareness of issues related to sustainability
7. Engage in lifelong learning

Program Learning Outcomes:

After completing the MS Statistics, students will be able to

1. Demonstrate mastery of core statistical theory;
2. Demonstrate proficiency in statistical methodology and data analysis;
3. Select, justify, and apply appropriate inferential and predictive methods;
4. Responsibly interpret results and output of statistical analyses;
5. Communicate effectively (written and oral) and organize/manage projects in collaborative settings (within and between disciplines);
6. Write code for statistical applications in one or more languages;
7. Gather and manage data from a variety of sources;
8. Collaborate with researchers and clients to solve data-oriented problems that arise in other disciplines; and,
9. Conduct independent learning and research.

Student Learning Outcomes:

All students will

1. Serve the needs of one or more research clients or collaborators by identifying, implementing, and mathematically defending the use of appropriate statistical methodology;
2. Practice self-learning skills to maintain currency in statistical and associated computing methodology through reading, discussion, and peer presentations of current practices as reflected in statistical literature;
3. Build and evaluate inferential and predictive models to analyze data with both numeric and categorical responses using statistical programming; and
4. Complete a written thesis and oral thesis defense.

Master of Science in Statistics (MS-STAT) SLO PLO Mapping Matrix.

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
SLO 1	x	x	x	x	x			x	
SLO 2					x				x
SLO 3	x	x	x	x		x	x		
SLO 4					x				x

b.   *These program proposal elements are required:*

• *Comprehensive Assessment Plan addressing all assessment elements*
• *Matrix showing where student learning outcomes are introduced (I), developed (D), and mastered (M)*

Key to program planning is creating a comprehensive assessment plan addressing multiple elements, including a strategy and tool to assess each student learning outcome. SLOs operationalize the PLOs and serve as the basis for assessing student learning in the major. Constructing an assessment matrix, showing the relationship between all assessment elements, is an efficient and clear method of displaying all assessment plan components.

Creating a curriculum map matrix, identifying the student learning outcomes, the courses where they are found, and where content is "introduced," "developed," and "mastered" insures that all student learning outcomes are directly related to overall program goals and represented across the curriculum at the appropriate times. Assessment of outcomes is expected to be carried out systematically according to an established schedule, generally every five years.

Comprehensive Program Assessment Plan:

The Statistics Department has a standing Assessment Committee that will evaluate MS program assessment elements identified in the comprehensive assessment plan. The Assessment Committee will summarize its assessment activities at the end of each academic year and will then report the results to the full Statistics Department faculty. The Assessment Committee will make recommendations on how the degree program can be improved based on the assessment results. The Department will decide upon and perform additional curricular follow-ups to all assessment activities, which may involve consultation with external bodies.

Direct Assessment:

The Statistics department will use the following as direct assessment of the master's program:

- o   Embedded questions in exams linked to specific SLOs/PLOs.

- o   Homework assignments, projects, oral presentations, statistical consulting, and written reports. We will use rubrics developed around certain criteria for specific learning outcome to be assessed. Each course will have artifacts linked to SLOs and PLOs.

Capstone Experience: Thesis Project:

Progress through the MS degree provides a cumulative experience beginning with foundational coursework and culminating with implementation of a research thesis. Students can experience this milestone through completion of the research thesis course (STAT 599) and publication of a written thesis report in a digital archive and/or peer review journal. Written reports will be evaluated using an appropriate rubric to assess many of the PLOs. The comprehensive assessment plan provides a structure to evaluate achievement of PLOs. The assessment plan aligns the Institutional Learning Outcomes, and the Program Learning Outcomes with the assessment activities, tools, schedule, reports, program findings and closing the loop strategies for program assessment and improvement.

Indirect Assessment:

The following methods will be used to collect data that reflects indirect assessment:

- o   Surveys/Interviews: The MS degree program will survey graduating students and alumni to gather data and feedback for assessment of program objectives.

- o   Postgraduate employer/advisory survey: External indicators can serve as excellent feedback that the MS degree is meeting its program goals. The postgraduate employer/advisory survey will help determine the success of graduates in securing positions in academia, private sector, governmental agencies, and non-profits.

Full Comprehensive Program Assessment Matrix:

Please refer to Appendix 1A – Program Assessment Matrix.

Curriculum Map Matrix:

	STAT 425/6/7 Statistical Theory Sequence	STAT 550 Generalized Linear Models	STAT 551 Statistical Learning with R	STAT 565 Graduate Consulting Practicum	STAT 590 Graduate Seminar	STAT 599 Thesis
SLO 1: Serve the needs of one or more research clients or collaborators by identifying, implementing, and mathematically defending the use of appropriate statistical methodology	I/D	D	D	M		
SLO 2: Practice self-learning skills to maintain currency in statistical and associated computing methodology through reading, discussion, and peer presentations of current practices as reflected in statistical literature	I		I		D/M	
SLO 3: Build and evaluate inferential and predictive models to analyze data with both numeric and categorical responses using statistical programming	I/D	D/M	D/M			
SLO 4: Complete a written thesis and oral thesis defense	I			D	D	M

Program content is introduced (I), developed (D), and/or mastered (M).

c. *Indicate total number of units required for graduation.*

45 quarter units

d. Include a justification for any baccalaureate program that requires more than 120-semester units or 180-quarter units. Programs proposed at more than 120 semester units will have to provide either a Title 5 justification for the higher units or a campus-approved request for an exception to the Title 5 unit limit for this kind of baccalaureate program.

(Not applicable to MS Program.)

e. If any formal options, concentrations, or special emphases are planned under the proposed major, identify and list the required courses. Optional: You may propose a CSU degree program code and CIP code for each concentration that you would like to report separately from the major program.

(Not applicable to MS Program.)

f. List any new courses that are: (1) needed to initiate the program or (2) needed during the first two years after implementation. Include proposed catalog descriptions for new courses. For graduate program proposals, identify whether each new course would be at the graduate- or undergraduate-level.

STAT 500 – Independent Study (1-4) – New Course*

Individual research or advanced study planned and completed under the direction of a departmental faculty member. Total degree credit limited to 4 units. Total credit limited to 12 units.
Prerequisite: Consent of graduate advisor.

STAT 541 - Advanced Statistical Computing with R (4) – New Course*

Advanced techniques for efficient use of R software to perform statistical computations, analyze large amounts of data, and develop new software. Includes version control systems; code design, documentation, and unit testing; modern data and database software; dynamic data visualizations; special data types; efficient processing of big data; functional programming and recursion; numerical integration and optimization; and. Use of R throughout the course. 4 lectures.
Prerequisites: C- or better in STAT 331 or 531, STAT 334, and STAT 426.

STAT 543 - Advanced Design and Analysis of Experiments (4) – New Course*

2^k and 3^k factorial and fractional factorial designs, balanced and partially balanced incomplete block designs, nested designs, split-plot designs, response surfaces, repeated measures, and other design approaches. Design matrices. Random and mixed effects models, confounding, different parameterizations.
Prerequisites: C- or better in STAT 323 or 523 and STAT 334 or 534.

STAT 545 - Applied Stochastic Processes (4) – New Course*

Properties, simulation, and application of stochastic processes. Discrete-time and continuous-time Markov chains, Poisson processes, Gaussian processes,

continuous-state Markov processes. Markov chain Monte Carlo (MCMC) simulation methods and applications. Fitting stochastic process models to data. Prerequisites: MATH 206 or MATH 244; and C- or better in STAT 426.

STAT 550 - Generalized Linear Models (4) – New Course

Theory and application of linear and generalized linear models, including modeling correlated responses, overdispersion, random effects models, mixed effects models, Bayesian generalized linear models, generalized additive models, model selection and model checking. Use of statistical software for implementation of methods.
Prerequisites: C- or better in STAT 334 and STAT 427.

STAT 551 - Statistical Learning with R (4) – New Course*

Modern methods in predictive modeling and classification. Splines, smoothing splines, ridge regression, LASSO, regression and classification trees, generalized additive models, logistic regression, and linear discriminant analysis. Model assessment and selection using cross validation, bootstrapping, AIC, and BIC. Use of the R programming language throughout.
Prerequisites: C- or better in STAT 334, STAT 331 or 531, and STAT 305 or STAT 350.

STAT 566 - Graduate Consulting Practicum (2) – New Course

Practice in statistical consulting. Observing faculty-led consulting sessions. Organizing and leading consulting projects with faculty supervision. Discussion of statistical consulting cases in a seminar format. 2 seminar.
Prerequisite: STAT 466 and graduate standing.

STAT 590 - Graduate Seminar (1) – New Course

Seminar built around topics in advanced statistics selected by the faculty. Discussion of current research papers in statistics. Course may be repeated for up to 3 units.
Prerequisite: Graduate standing and consent of instructor.

STAT 599 – Thesis (4) – New Course

Selection by individual or group, with faculty guidance and approval, of topic for independent research or investigation resulting in a thesis or project to be used to satisfy the degree requirement. An appropriate experimental or analytical thesis or project may be accepted. Total credit limited to 8 units.
Prerequisite: Graduate standing and consent of instructor.

* These courses replace existing 400-level courses.

g. Attach a proposed course-offering plan for the first three years of program implementation, indicating likely faculty teaching assignments.

Fall 2023:

STAT 425	Probability Theory (4) (Carlton)
STAT 541	Advanced Statistical Computing with R (4) (Bodwin)

Winter 2024:

STAT 426	Estimation and Sampling Theory (4) (Sun)
STAT 545	Applied Stochastic Processes (4) (Ross)
STAT 551	Statistical Learning with R (4) (Bodwin)

Spring 2024:

STAT 427	Mathematical Statistics (4) (Sun)
STAT 466	Statistical Consulting (4) (Schaffner)
STAT 543	Advanced Design and Analysis of Experiments (4) (McGaughey)
STAT 550	Generalized Linear Models (4) (Walker)

Fall 2024:

STAT 425	Probability Theory (4) (Carlton)
STAT 541	Advanced Statistical Computing with R (4) (Bodwin)
STAT 566	Graduate Consulting Practicum (2) (various faculty)
STAT 590	Graduate Seminar (1) (Sun)

Winter 2025:

STAT 426	Estimation and Sampling Theory (4) (Sun)
STAT 545	Applied Stochastic Processes (4) (Ross)
STAT 551	Statistical Learning with R (4) (Glanz)
STAT 590	Graduate Seminar (1) (Carlton)
STAT 599	Thesis (4) (various faculty)

Spring 2025:

STAT 427	Mathematical Statics (4) (Sun)
STAT 466	Statistical Consulting (4) (Smith)
STAT 550	Generalized Linear Models (4) (Walker)
STAT 590	Graduate Seminar (1) (Bodwin)
STAT 599	Thesis (4) (various faculty)

Fall 2025:

STAT 425	Probability Theory (4) (Carlton)
STAT 541	Advanced Statistical Computing with R (4) (Bodwin)
STAT 566	Graduate Consulting Practicum (2) (various faculty)
STAT 590	Graduate Seminar (1) (Sun)

Winter 2026:

STAT 426	Estimation and Sampling Theory (4) (Sun)
STAT 545	Applied Stochastic Processes (4) (Ross)
STAT 551	Statistical Learning with R (4) (Bodwin)
STAT 590	Graduate Seminar (1) (Carlton)
STAT 599	Thesis (4)

Spring 2026:
        STAT 427   Mathematical Statistics (4) (Sun)
        STAT 466   Statistical Consulting (4) (Schaffner)
        STAT 550   Generalized Linear Models (4) (Walker)
        STAT 590   Graduate Seminar (1) (Bodwin)
        STAT 599   Thesis (4)

Note: This schedule to be revised in accordance with the University's timeline for conversion to a semester system.

h. *For master's degree proposals, include evidence that program requirements conform to the minimum requirements for the culminating experience, as specified in Section 40510 of Title 5 of the California Code of Regulations.*

(1) *The completion of a specified pattern of study approved by the appropriate campus authority.*

[Administrative reviews pending.]

(2) *A minimum of thirty semester units of approved graduate work completed within a maximum time to be established by each campus.*

The MS degree requires completion of 45 quarter units, equivalent to 30 semester units.

    (A) *Not less than 21 semester units (32 quarter units) shall be completed in residence.*

The MS degree requires at least 32 quarter units be completed in residence.

    (B) *Not less than one-half of the units required for the degree shall be in courses organized primarily for graduate students.*

The MS degree requires a minimum of 27 quarter units of 500 level courses. (This accounts for 60% of total required units)

    (C) *Not more than six semester units shall be allowed for a thesis or project.*

The MS degree does not allow more than 9 quarter units for a thesis or project.

(3) *Satisfactory completion of a thesis, project, or comprehensive examination.*

The MS degree requires completion of a thesis (8 quarter units)

(4) *A grade point average of 3.0 (grade of B) or better in all courses taken to satisfy the requirements for the degree, except that a course in which no letter grade is assigned shall not be used in computing the grade point average.*

The MS degree requires a grade point average of 3.0 or better.

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i. For graduate degree proposals, cite the corresponding bachelor's program and specify whether it is (a) subject to accreditation and (b) currently accredited.

(WASC 2013 CFR: 2.2b)

The Cal Poly bachelor's program in Statistics is the primary bachelor's program corresponding to the proposed MS in Statistics. This program is not subject to accreditation.

j. For graduate degree programs, specify admission criteria, including any prerequisite coursework.

(WASC 2013 CFR: 2.2b)

Minimum requirements for applicants to be considered are:
- Filing of an application for Graduate Admission (https://www2.calstate.edu/apply) by the deadlines specified at http://admissions.calpoly.edu/applicants/
- Submission of Graduate Record Exam (GRE) General Test scores electronically to Institution Code: R4038. While no minimum GRE scores have been established, they will be used along with other factors (statement of purpose, transcripts, recommendations, etc.) by Graduate Admissions Committee as they consider student applications
- Submission of three letters of recommendation from a source that can attest to the academic capabilities of the applicant. All letters of recommendation must be uploaded through Cal State Apply
- Statement of purpose describing the student's background and future goals in statistics
- Completion of a bachelor's degree from an accredited college/university with a minimum grade point average of 3.0 and completion of the following undergraduate coursework:
  - *Statistics*: At least two courses
  - *Mathematics*: Multivariable calculus (equivalent to Cal Poly MATH 241) and linear algebra (equivalent to Cal Poly MATH 206)
  - *Computer Science*: At least course, equivalent to Cal Poly CPE 101

Beyond the minimum requirements, the following considerations are relevant:
- Completion of undergraduate coursework in probability, regression, experimental design, and R. An applicant who lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies (12 unit limit) before advancement to classified graduate standing.

All applicants who do not speak and write English as their primary language are required to complete the Test of English as a Foreign Language (TOEFL), taken within the last 2 years with a minimum score of 550 (paper version), 213 (computerized version), or 80 (internet based). Submit scores electronically to Institution Code: 4038. This requirement does not apply if country of citizenship is listed on Cal Poly Admissions website: http://admissions.calpoly.edu/applicants/international/checklist.html

k. For graduate degree programs, specify criteria for student continuation in the program.

Each quarter students are enrolled, satisfactory progress on the Formal Study Plan is expected to be made. Satisfactory academic progress shall be defined as maintaining a 3.0 GPA on all courses listed on the formal study plan. In addition, per University requirement, "graduate students are required to maintain continuous enrollment from the time of first enrollment in a graduate program until completion of the degree. Continuous enrollment is defined as being enrolled during Fall, Winter, and Spring quarters each year. Students can maintain continuous enrollment either by being enrolled as a regular student; obtaining approval for an education or medical leave prior to the quarter when such a leave would begin; or by registering in a special course designated for this purpose, during quarters in which they are not regularly enrolled. Students who fail to fulfill this continuous enrollment requirement will be not be permitted to graduate even if all degree requirements have been completed until payment has been made for all quarters of non-enrollment. In addition, all graduate students must be enrolled the quarter they graduate."

l. For undergraduate programs, specify planned provisions for articulation of the proposed major with community college programs.

(Not applicable to MS Program.)

m. Provide an advising "roadmap" developed for the major.

(Not directly applicable to MS Program)
See "Supplement 5: Degree Flowchart" for additional degree roadmap details.

n. Describe how accreditation requirements will be met, if applicable, and anticipated date of accreditation request (including the WASC Substantive Change process).

(WASC 2013 CFR: 1.8)

(Not applicable to this MS Program.)

5. Societal and Public Need for the Proposed Degree Major Program

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

The following CSU campuses offer an M.S. in Statistics:
East Bay, San Jose, Fullerton, Long Beach, and San Diego.

In the broader Central Coast region, UC Santa Barbara also offers an M.A. in Statistics.

b. Describe differences between the proposed program and programs listed in Section 5a above.

Cal Poly San Luis Obispo is one of only two CSUs to have a standalone Statistics department, with 20 tenure-track faculty members whose training and research is

specifically focused in statistics and data analysis. The CSU campuses currently offering graduate degrees in statistics are all located very far from the Central Coast, so we expect our program to fill a geographical gap. As the flagship CSU, Cal Poly SLO is well suited to offer a rigorous Master's program, comparable to those at large research institutions.

Locally, the only comparable program is the M.A. in Statistics at UC Santa Barbara. This program is comparable in focus; however, it is housed at a large research university, alongside a Ph.D. program in Statistics, and thus will be culturally distinct from the proposed degree at Cal Poly SLO. Additionally, employment data suggests that the demand for advanced statistics degrees far outstrips the current supply of degree programs. We view the proximity of UC Santa Barbara as an opportunity for cross-institutional research and collaboration.

c. List other curricula currently offered by the campus that are closely related to the proposed program.

The only loosely comparable graduate program on the San Luis Obispo campus is the M.S. in Business Analytics offered by the Orfalea College of Business. Although this program offers some coursework in statistical analysis and visualization, its primary focus is data-based decision making in business and marketing. The proposed M.S. in Statistics would provide direct training in statistical skills and thought, for application in a variety of fields.

d. Describe community participation, if any, in the planning process. This may include prospective employers of graduates.

No community participation is needed for the planning process. However, the creation of the M.S. in Statistics is partially informed by a survey of 104 alumnae of the B.S. in Statistics at Cal Poly, which included questions to potential employers regarding the marketability of a Statistics M.S. degree. (See below)

e. Provide applicable workforce demand projections and other relevant data.

Statistics is one of the fastest-growing areas of job demand in the United States. A recent market analysis study performed for the College of Science and Mathematics (CSM) by Hanover Research found 6,365 statistics-related job postings in California in the past 6 months alone. Of these, approximately 1,000 were direct statistician/biostatistician positions, which typically require graduate degrees. The market research study also found a projected growth rate for statistics-related jobs in California from 2016 to 2026 is of 19%. This trend, and the trend holds regionally in the West (18.7%) and nationally (18.1%) as well. The Hanover study further indicates that statisticians in government, business, and industry earn between $17,000 and $50,000 more per year if they hold a Master's degree.

These findings are supported by other national studies: Glassdoor has ranked "data scientist" the #1 job in America several years in a row, with a median salary of $110,000, and it is estimated that the demand for data science skills will increase by over 90% in the next 2 years. The Bureau of Labor Statistics also reports an increasing demand for Master's level statistics skills, and the annual survey of the American Statistical Association notes a marked salary increase for statisticians with a Master's degree.

Locally, there is also strong evidence for the market value of a graduate degree. In a recent survey of alumni of the Cal Poly Statistics Department (to which 104 people responded), 82% of those employed in industry stated that their workplace would be "somewhat more" or "much more" likely to hire an applicant with a Master's degree. Most respondents cited the need for specialized data skills as the reason for this preference. Respondents also frequently cited training in specific skills and experience producing independent research as attractive features to prospective employers.

The Statistics Department at Cal Poly has a reputation for producing graduates who are prepared to succeed in the workforce immediately upon graduation. However, as analyses of data-based questions become more complex, the skills required for the most desirable jobs become more specialized. By offering an M.S. program in Statistics, Cal Poly would vastly improve the employment opportunities and job quality of its graduates.

6. Student Demand

a. Provide compelling evidence of student interest in enrolling in the proposed program. Types of evidence vary and may include (for example), national, statewide, and professional employment forecasts and surveys; petitions; lists of related associate degree programs at feeder community colleges; reports from community college transfer centers; and enrollments from feeder baccalaureate programs.

The recent market analysis study performed by Hanover Research concluded that we should move forward with a master's program in Statistics partly because of the strong student demand for such a program across all geographic levels. Hanover Research cites an average annualized growth rate for master's degrees in Statistics in California nearly three times the growth rate for all master's degrees in California. Explicitly, master's degrees conferrals in Statistics grew at an annualized rate of 9.6 percent 2013 to 2017, much faster than the rate for master's degrees across all fields (3.3 percent). Trends at the regional and national levels are even stronger, with 9.8 percent and 14.7 percent growth, respectively. Similarly, bachelor's degrees in statistics programs are also experiencing rapid growth, indicating a strong outlook for Cal Poly's current undergraduate program, as well as growing prospective student market for the proposed master's program in Statistics. The integrated postsecondary education data system (IPEDS) indicates 18 master's level and 16 bachelor's level Statistics programs in California in 2017. Regionally, there are 24 master's level and 19 bachelor's level program in the Far West. In considering the very strong growth at both degree levels, Cal Poly is well positioned to launch a new master's degree in Statistics.

To ascertain student demand for and interest in a master's program in Statistics, in fall 2018 we surveyed our current students as well as alumni. Out of the 104 alumni who responded, 47.6% indicated that they pursued advanced degrees elsewhere after graduating from Cal Poly, and 79.6% said they would have been "somewhat" or "very" likely to enroll in an M.S. in statistics at Cal Poly if one had been offered. Similarly, out of the 62 current Cal Poly statistics majors who responded, 73.1% (46 students) indicated that they would be

likely to pursue such a program. Both alumni and current students frequently cited the need for further training in specific skills and experience producing independent research as reasons for their interest. Several current students also emphasized the increased job availability as a factor in their decision. The surveyed alums and current students also provided positive written comments on the prospects, utility and career impact of the proposed program (see appendix 3 for their complete and verbatim comments).

Furthermore, the Statistics Department collects data on graduating seniors every year for program assessment. Over the years, we have gathered encouraging information on student demand and interest for a master's program. For instance, out of the 29 graduating seniors surveyed in 2017, 86.2% indicated that they would "likely" or "definitely" consider a master's program in applied Statistics as an academic option. Similarly, out of the 31 graduating seniors surveyed in 2018, 83.9% indicated that they would "likely" or "definitely" consider a master's program in applied Statistics as an academic option. A high percentage of the 2017 (62.1%) and 2018 (64.5%) graduating seniors surveyed indicated that they would "definitely" consider such a program.

In this light, the department will recruit prospective master's students from three sources:
>   1) existing undergraduate Statistics majors,
>   2) existing Statistics and Data Science minors, and
>   3) external students through the general Cal Poly graduate admissions process.
Based on our current and forecasted tenured/tenure-track faculty density, we anticipate our graduate program can sustain approximately 20 graduate students per cohort. We estimate that at least 15 of our existing undergraduate majors and minors will be recruited for the master's program along with at least 5 external candidates.

b.   Identify how issues of diversity and access to the university were considered when planning this program. Describe what steps the program will take to insure ALL prospective candidates have equitable access to the program. This description may include recruitment strategies and any other techniques to insure a diverse and qualified candidate pool.

We are committed to achieving a diverse student group in the MS program. The Cal Poly undergraduate students most likely to enroll in the new program are already gender-diverse. A growing M.S. program with funded research projects will provide an opportunity to recruit individuals from diverse ethnic backgrounds and lower socioeconomic status. Because the proposed program involves on-campus delivery of courses, issues of access for non-traditional students cannot be solved via a distance M.S. program approach. However, we will accommodate when possible non-traditional students such as those in the workforce who may take a longer path to completion of the M.S. degree. In particular, students may enter the program via existing partnerships of the Statistics Departments with local or Bay Area companies such as Google, MindBody JupyterLabs, etc. In these cases, we will be flexible with curriculum design and work closely with students' supervisors to create a plan of study that is feasible within the constraints of workforce demands.

c.   For master's degree proposals, cite the number of declared undergraduate majors and the degree production over the preceding three years for the corresponding baccalaureate program, if there is one.

	Undergraduate enrollment (Fall Census)			Total degrees awarded		
Year	2019/2020	2020/21	2021/22	2018/19	2019/20	2020/21
Statistics majors	176	192	198	34	40	44

d.   Describe professional uses of the proposed degree program.

In 2015, the Bureau of Labor Statistics named "Statistician" as one of the fastest-growing jobs in the United States. There are countless opportunities for holders of Master's degree in statistics. Our graduates will be equipped with a singular set of analytical skills that will make them valuable in industry, government, academia and almost every area of science. Below are some of the main career paths for prospective graduates from our program:

- Statistician (research analyst for a corporation or a federal/state/local agency, such as the U.S. Census Bureau)
- Data Scientist (for tech companies, such as Google, and other corporations)
- Biostatistician (research analyst for a corporation, such as Amgen, or a federal/state/local agency, such as the CDC or a county public health department)
- Sports statistician
- University lecturer
- MS as preparation for PhD in Statistics, Biostatistics, or Data Science

According to the Hanover Research market analysis, California employers advertised 5,365 statistics-related jobs between July 2018 and December 2018.

e.   Specify the expected number of majors in the initial year, and three years and five years thereafter. Specify the expected number of graduates in the initial year, and three years and five years thereafter.

We anticipate the following student enrollments with an average degree completion time of 2 years.

	At Initiation	After 3 Years	After 5 Years
Number of Majors (Annual)	15	20	20
Number of Graduates (Cumulative)		40	80

7. Existing Support Resources for the Proposed Degree Major Program

a.   List faculty who would teach in the program, indicating rank, appointment status, highest degree earned, date and field of highest degree, professional experience, and affiliations with other campus programs. Note: For all proposed graduate degree programs, there must be a minimum of five full-time faculty members with the appropriate terminal degree. (Coded Memo EP&R 85-20)

Name	Rank/Title	Degree	Research
Dr. Andrew Schaffner	Professor, Chair	Ph.D. Statistics University of Washington, Seattle 1997	Public Health Ecology (sampling, monitoring, models), Agriculture Consulting
Dr. Allan Rossman	Professor	Ph.D. Statistics Carnegie Mellon University 1989	Statistics education Curriculum development Interviews with statistics educators
Dr. Kelly Bodwin	Assistant Professor	Ph.D. Statistics University of North Carolina, Chapel Hill 2017	Data mining Machine learning Big data Statistical computing Applications in text analysis, social science, and biology
Dr. Matt Carlton	Professor	Ph.D. Mathematics University of California, Los Angeles 1999	Applied probability Statistics education Predictive modeling for higher-education outcomes
Dr. Beth Chance	Professor	Ph.D. Operations Research Cornell University 1994	Curriculum development and assessment in statistics education Statistics education research
Dr. Jimmy Doi	Professor	Ph.D. Statistics	Categorical Data Analysis

		North Carolina State University 2003	Biostatistics Statistical Computing Statistics Education
Dr. Samuel Frame	Professor	Ph.D. Statistics and Applied Probability University of California, Santa Barbara 2007	Statistical Computing Computational Statistics Quantitative Finance and Economics Business Analytics Online Course Development
Dr. Hunter Glanz	Associate Professor	Ph.D. Statistics Boston University 2014	Statistical Computing Education Data Science Education Remote Sensing Machine Learning
Dr. Giri Gopalan	Assistant Professor	Ph.D. Statistics University of Iceland 2017	Hierarchical and Bayesian statistical modeling Spatio-temporal statistics Applications to the natural sciences and engineering (e.g., glaciology)
Dr. Bret Holladay	Assistant Professor	Ph.D. Statistics University of California, Santa Barbara 2016	Theory of Estimation Confidence Intervals Statistics Education
Dr. Ulric Lund	Professor	Ph.D. Statistics University of California, Santa Barbara 1998	Circular Statistics Motor Vehicle and Bicycle Accident Data Analysis Statistical Computing Statistical Consulting
Dr. Karen McGaughey	Professor	Ph.D. Statistics Kansas State University 2003	Design of experiments Statistics education Statistical consulting Applications of statistics to engineering
Dr. Zoe Rehnberg*	Assistant Professor	Ph.D. Statistics University of	Biostatistics and genetics

		Michigan 2022 (expected)	
Dr. Steve Rein	Associate Professor	Ph.D. Statistics UC Berkeley 1993	Time series analysis and statistical applications in the biological sciences
Dr. Emily Robinson*	Assistant Professor	Ph.D. Statistics University of Nebraska at Lincoln 2022 (expected)	Statistical Education
Dr. Kevin Ross	Associate Professor	Ph.D. Statistics University of North Carolina at Chapel Hill 2006	Probability and stochastic processes and applications Probability and statistics education
Dr. Soma Roy	Professor	Ph.D. Statistics The Ohio State University 2008	Statistics Education - Curriculum development Design and Analysis of Experiments Statistics in Health Sciences and Social Sciences
Dr. Anelise Sabbag	Assistant Professor	Ph.D. Quantitative Methods in Education (Statistics Education Core) University of Minnesota 2016	Statistics education Assessment development Educational measurement Online teaching
Dr. Jeff Sklar	Professor	Ph.D. Statistics UC Santa Barbara 2003	Survival analysis Educational statistics and measurement Nonparametric regression
Heather Smith	Lecturer	M.S. Statistics Florida State University 1989	Statistical consulting and collaboration Engineering and industrial statistics Quality management Enology and viticulture research Experimental design and survey

			research design
Dr. Dennis Sun**	Associate Professor	Ph.D. Statistics Stanford University 2015	Data science Statistical software Statistics education Audio signal processing
Dr. Allison Theobold	Assistant Professor	Ph.D. Statistics Education Montana State University 2017	Data science Statistical software Statistics education
Dr. John Walker	Professor	Ph.D. Statistics Cornell University 1995	Statistical computing Statistical consulting Statistics education Linear models

* New hire; expected start date Fall 2022
** Also affiliated with Cal Poly Department of Computer Science and Google.

b. *Describe facilities that would be used in support of the proposed program.*

Cal Poly has 5.8 million square feet in 149 major buildings to support educational activities. The majority of the courses for this MS program will occur in general purpose classrooms or computer laboratories utilized by the College of Science and Mathematics. All classrooms at Cal Poly are internet (Wi-Fi and Ethernet) ready and utilize Smart Room technology, including electronic projectors or monitors.

The Statistics Department has one studio computer lab, with a capacity of 35 students at individual computer workstations.

See: Supplement 8: Strategic Enrollment Management Letter of Support

c. *Provide evidence that the institution provides adequate access to both electronic and physical library and learning resources.*

Kennedy Library computer resources:
(http://lib.calpoly.edu/use-tech-and-print/borrow-laptops-ipads-and-more/)

See: Supplement 9: Kennedy Library Letter of Support

d. *Describe available academic technology, equipment, and other specialized materials.*

Faculty and Students have access to the following:

- University-wide Information Technology
- PolyLearn Portal (Moodle)
- Canvas Portal
- Office 365 email and calendar service
- Mustang Wireless Wi-Fi access.
- Office 365: One Drive (1 TB backup drive)
- Classroom response system technology (clickers, wi-fi enabled devices)
- Over 300 computers throughout library
- Equipment loans: laptops, iPads, Kindles, and associated peripherals (e.g. headphones
- etc.), projectors, cameras,
- Data Studio: Assistance with large computing needs including GIS, data and maps.
- Cal Poly Print: print, copy and scanning services
- Assistive technology stations

8. Additional Support Resources Required

a. Describe additional faculty or staff support positions needed to implement the proposed program.

Our support needs were initially determined under the assumption of 21 full-time tenured or tenure-track faculty during the academic year prior to the implementation of the MS program. At inception, we anticipated a need for one additional tenured or tenure-track faculty member (bringing the total to 22) for administrative duties, supervision of graduate research, and instruction of newly proposed graduate courses in the curriculum of the program. We also anticipated a need for an additional tenured or tenure-track faculty member in the first three to five years, to allow for growth in the M.S. program as well as the Data Science program.

As of Winter 2022, the Statistics Department consists of 21 full-time tenured or tenure-track faculty members and two newly hired tenure-track faculty members with an anticipated start date of Fall 2022. (See Supplement 6: New Position Approval.)

We do not foresee a need for any additional lecturer or staff positions in relation to the MS program in the short term.

b. Describe the amount of additional lecture and/or laboratory space required to initiate and to sustain the program over the next five years. Indicate any additional special facilities that will be required. If the space is under construction, what is the projected occupancy date? If the space is planned, indicate campus-wide priority of the facility, capital outlay program priority, and projected date of occupancy. Major capital outlay construction projects are those projects whose total cost is $610,000 or more (as adjusted pursuant to Cal. Pub. Cont. Code §§ 10705(a); 10105 and 10108).

Because the MS coursework consists primarily of elevations of existing classes, we do not anticipate a need for additional space immediately at inception.

However, the addition of the MS program - in combination with anticipated growth in the undergraduate degree program and ever-increasing enrollment in statistics service courses

– increases demand for Studio Classroom space. We anticipate a need for an additional Studio classroom within the first 3-5 years of the MS program.

c.   *Include a report written in consultation with the campus librarian which indicates any necessary library resources not available through the CSU library system. Indicate the commitment of the campus to purchase these additional resources.*

No additional library resources are required to implement the program, nor is any such need anticipated during the first few years of the program.

d.   *Indicate additional academic technology, equipment, or specialized materials that will be (1) needed to implement the program, and (2) needed during the first two years after initiation. Indicate the source of funds and priority to secure these resource needs.*

No additional academic technology, equipment or specialized materials are required to implement the program, nor is any such need anticipated during the first few years of the program.

9. Self-Support Programs

N/A

ILOs	PLOs	SLOs	Course where SLO is assessed	Assessment activity used to measure each SLO	Assessment tool used to measure outcome success	Assessment schedule – how often SLOs will be assessed	How assessment data will be reported as evidence SLO performance criteria have been met	Designated personnel to collect, analyze, and interpret student learning outcome data for the program	Student learning outcome data dissemination schedule	Closing the loop strategies
ILO 1: Think critically and creatively ILO 3: Demonstrate expertise in a scholarly discipline and understand that discipline in relation to the larger world of the arts, sciences, and technology ILO 4: Work productively as individuals and in groups	PLO 5: Communicate effectively (written and oral) and organize/manage projects in collaborative settings (within and between disciplines) PLO 9: Conduct independent learning and research	SLO 2: Practice self-learning skills to maintain currency in statistical and associated computing methodology through reading, discussion, and peer presentations of current practices as reflected in statistical literature	STAT 599	Research Proposal	Rubric designed for each SLO.	Once every two years starting in year two.	Report on minimum percentage of students that meet or exceed standards for each SLO.	The thesis committee will assign and grade assessment using rubric developed for this assignment. Department's assessment coordinator will analyze rubric data.	Assessment data will be report to Academic Planning and Programs. The University Academic Assessment Council will review the reports and provide feedback. Feedback will be used to improve assessment for the following year.	The assessment committee will review the data and identify where improvement is needed.
ILO 1: Think critically and creatively ILO 2: Communicate effectively ILO 3: Demonstrate expertise in a scholarly discipline and understand that discipline in relation to the larger world of the arts, sciences, and technology ILO 4: Work productively as individuals and in groups ILO 5: Use their knowledge and skills to make a positive contribution to society ILO 6: Make reasoned decisions based on an understanding of	PLO 1: Demonstrate mastery of core statistical theory PLO 2: Demonstrate proficiency in statistical methodology and data analysis PLO 3: Select, justify, and apply appropriate inferential and predictive methods PLO 4: Responsibly interpret results and output of statistical analyses PLO 5: Communicate effectively (written and oral) and organize/manage projects in collaborative settings (within and between disciplines) PLO 6:	SLO 1: Serve the needs of one or more research clients or collaborators by identifying, implementing, and mathematically defending the use of appropriate statistical methodology SLO 2: Practice self-learning skills to maintain currency in statistical and associated computing methodology through reading, discussion, and peer presentations of current practices as reflected in statistical literature SLO 3: Build and evaluate inferential and predictive models to analyze data with both numeric and categorical responses using statistical programming SLO 4: Complete a written thesis and oral thesis defense	STAT 599	Written Thesis	Rubric designed for each SLO.	Once every two years starting in year two.	Report on minimum percentage of students that meet or exceed standards for each SLO.	The thesis committee will assign and grade assessment using rubric developed for this assignment. Department's assessment coordinator will analyze rubric data.	Assessment data will be report to Academic Planning and Programs. The University Academic Assessment Council will review the reports and provide feedback. Feedback will be used to improve assessment for the following year.	The assessment committee will review the data and identify where improvement is needed.

ethics, a respect for diversity, and an awareness of issues related to sustainability ILO 7: Engage in lifelong learning	Write code for statistical applications in one or more languages PLO 7: Gather and manage data from a variety of sources PLO 8: Collaborate with researchers and clients to solve data oriented problems that arise in other disciplines PLO 9: Conduct independent learning and research									
ILO 1: Think critically and creatively ILO 2: Communicate effectively ILO 3: Demonstrate expertise in a scholarly discipline and understand that discipline in relation to the larger world of the arts, sciences, and technology ILO 4: Work productively as individuals and in groups ILO 6: Make reasoned decisions based on an understanding of ethics, a respect for diversity, and an awareness of issues related to sustainability ILO 7: Engage in lifelong learning	PLO 1: Demonstrate mastery of core statistical theory PLO 2: Demonstrate proficiency in statistical methodology and data analysis PLO 3: Select, justify, and apply appropriate inferential and predictive methods PLO 4: Responsibly interpret results and output of statistical analyses PLO 5: Communicate effectively (written and oral) and organize/manage projects in collaborative settings (within and between disciplines) PLO 8: Collaborate with researchers and clients to solve data oriented problems that arise in other disciplines PLO 9: Conduct independent learning and research	SLO 1: Serve the needs of one or more research clients or collaborators by identifying, implementing, and mathematically defending the use of appropriate statistical methodology SLO 4: Complete a written thesis and oral thesis defense	STAT 599	Oral Defense	Rubric designed for each SLO.	Once every two years starting in year two.	Report on minimum percentage of students that meet or exceed standards for each SLO.	The thesis committee and faculty members in attendance will grade assessment using rubric developed for this assignment. Department's assessment coordinator will analyze rubric data.	Assessment data will be report to Academic Planning and Programs. The University Academic Assessment Council will review the reports and provide feedback. Feedback will be used to improve assessment for the following year.	The assessment committee will review the data and identify where improvement is needed.

ILO 7: Engage in lifelong learning	PLO 1: Demonstrate mastery of core statistical theory PLO 2: Demonstrate proficiency in statistical methodology and data analysis PLO 3: Select, justify, and apply appropriate inferential and predictive methods PLO 4: Responsibly interpret results and output of statistical analyses PLO 5: Communicate effectively (written and oral) and organize/manage projects in collaborative settings (within and between disciplines) PLO 6: Write code for statistical applications in one or more languages PLO 7: Gather and manage data from a variety of sources PLO 8: Collaborate with researchers and clients to solve data oriented problems that arise in other disciplines PLO 9: Conduct independent learning and research	SLO 1: Serve the needs of one or more research clients or collaborators by identifying, implementing, and mathematically defending the use of appropriate statistical methodology SLO 2: Practice self-learning skills to maintain currency in statistical and associated computing methodology through reading, discussion, and peer presentations of current practices as reflected in statistical literature SLO 3: Build and evaluate inferential and predictive models to analyze data with both numeric and categorical responses using statistical programming		**Postgraduate employer/advisory survey**	Survey	Once every two years starting in year two.	Report on minimum percentage of students that meet or exceed standards for each SLO.	The graduate program coordinator will assign, administer and analyze data from survey.	Assessment data will be report to Academic Planning and Programs. The University Academic Assessment Council will review the reports and provide feedback. Feedback will be used to improve assessment for the following year.	The assessment committee will review the data and identify where improvement is needed.

M.S. Statistics – Statement of Support

Statistics Department Curriculum Committee

The Statistics Department Curriculum Committee strongly supports the MS in Statistics. The program, as well as each course, has been reviewed and approved by the committee. The degree program offers a comprehensive curriculum with an emphasis in real world applications, including computing and consulting. Students graduating with an M.S. in Statistics from Cal Poly State University, San Luis Obispo will be prepared to contribute immediately upon entering the workforce.

This M.S. in Statistics aligns with the mission of the Statistics Department, complementing our strong B.S. in Statistics. It provides an opportunity for both faculty and undergraduates to engage with a challenging graduate curriculum that will enhance the department, creating more opportunities for collaboration and contribution to the university and beyond. We see the implementation of this degree program as a positive contribution to our department, Cal Poly and the CSU and strongly support the implementation of this degree program.

Approval by College of Science and Math Curriculum Committee

From: Elena Keeling <ekeeling@calpoly.edu>
Sent: Thursday, January 27, 2022 7:29 PM
To: Andrew A. Schaffner <aschaffn@calpoly.edu>; Gregory Shannon Bohr <gbohr@calpoly.edu>
Cc: Kelly N. Bodwin <kbodwin@calpoly.edu>; John H. Walker <jwalker@calpoly.edu>
Subject: Re: CCC and ASCC confirmation of review for MS Statistics

Hello Andrew,

You still have approval from the CSM Curriculum Committee.

Elena Keeling
Biological Sciences Department
Cal Poly, San Luis Obispo
ekeeling@calpoly.edu

Approval by Academic Senate Curriculum Committee

From: Gregory Shannon Bohr <gbohr@calpoly.edu>
Sent: Thursday, January 27, 2022 8:15 PM
To: Andrew A. Schaffner <aschaffn@calpoly.edu>; Elena Keeling <ekeeling@calpoly.edu>
Cc: Kelly N. Bodwin <kbodwin@calpoly.edu>; John H. Walker <jwalker@calpoly.edu>
Subject: RE: CCC and ASCC confirmation of review for MS Statistics

Hi Andrew –

The Academic Senate Curriculum Committee discussed this at our meeting today, and we confirm our support for the MS Statistics proposal.

Would you like a memo to that effect, or is this email sufficient?

Best,
Greg

Dr. Gregory S. Bohr
Associate Professor of Geography, Social Sciences Department
Chair, Academic Senate Curriculum Committee
Cal Poly, San Luis Obispo
(805) 756-1322, Building 47 - 12C

M.S. Statistics - Approved 400-Level Electives

Course	Name	Units	Prerequisites
DATA 402	Mathematical Foundations of Data Science	3	CSC 466, STAT 334, DATA 301; Concurrent DATA 401, DATA 403
DATA 403	Data Science Process Laboratory	1	Concurrent DATA 401, DATA 402
CSC 448	Bioinformatics Algorithms	4	CSC 349
CSC 466	Knowledge Discovery from Data	4	CSC 349
CSC 477	Sci and Info Visualization	4	CSC 349
MATH 406	Linear Algebra III	4	MATH 306
MATH 412	Introduction to Analysis I	4	MATH 306
MATH 413	Introduction to Analysis II	4	MATH 412
MATH 414	Introduction to Analysis III	4	MATH 413
MATH 451	Numerical Analysis I	4	MATH 242
MATH 453	Numerical Optimization	4	MATH 306 and MATH 451
STAT 410	Statistics Education	4	STAT BS
STAT 415	Bayesian Reasoning and Methods	4	STAT BS
STAT 416	Stat Analysis of Time Series	4	STAT BS
STAT 417	Survival Analysis Methods	4	STAT BS
STAT 419	Applied Multivariate Statistics	4	STAT BS
STAT 421	Survey Sampling and Method	4	STAT BS
STAT 440	SAS Certification Prep	2	STAT BS
STAT 441	SAS Adv Certification Prep	2	STAT 440

Notes:

As a prerequisite "STAT BS" indicates the prerequisite courses are required as part of the BS in Statistics.

STAT 414 and 418 are deliberately omitted from this list; students considering an M.S. should enroll in STAT 550 in lieu of these courses.

Survey of current students

What would be the main factors in your decision to apply or not?
How mathematically rigorous it is
Completion Time, Faculty
If the program exists
quality of teaching, local work opportunities
Whether I got competitive job offers after graduation
Availability
I would definitely apply because I intend on pursuing my masters.
I would 100% apply. No questions asked.
I want to go somewhere else. Try different things. Meet new people. People keeps talking about 4+1 and get out early to get a job. I just want to challenge myself and enjoy life.
How developed the program is and what is has to offer for a future career
GPA
Length of masters (preferably <= 12 months), scope of material (more applied than theoretical)
I was planning on getting my masters in statistics after graduating so it would be great if it was offered here!
cost and whether I need a masters
Funding
Course offerings / cost / field of study
if it is 4+1 program
If it's available by the time I graduate
how expensive it is, and if it would increase my chances at getting a good job
I'm not looking to go get a master's degree since I'm focused on passing actuarial exams and working after graduation. If I were not pursuing an actuarial career, I would be getting a graduate degree. I would apply to Cal Poly if I were planning to get a Master's in Statistics.
It would be great to stay at Cal Poly and work with the same professors in a familiar environment
I don't know much about other statistics masters programs, so I would want to do research on other programs and apply to others also
Depending on the number of actuary tests I have passed
The main factor fir me would be how long it would take, as well as the cost.
If I actually decide that I want to pursue grad school
The career I have in mind at the moment doesn't require a master's degree.
I am not completely sure what I want to do yet.
If I want to further my education
Details of the Program
I would be more likely to apply if it was a 4+1 program.
Coursework
Actuarial path won't need masters
If I could get a job right out of undergrad or not
I'm looking to apply for a PhD program, and probably not in pure statistics, so it's kind of irrelevant for me. However, if I were planning on getting a masters in statistics, things I would consider include: is it a 2 year program or 4+1 with the stats major? What's the curriculum like? Is it flexible (are there different

tracks or electives)? Also I would take into account the rankings of other programs.
Focus of study available
If I can do 4 + 1
I was born and raised in SLO. My family lives here.
Want to get other degree
Seeing if I want to earn a Master's degree in something other than statistics
It might be too late to apply. However I do plan to work for a little bit first so we will see
How much I am getting out of the program for how much I am paying
Cost, how important a masters degree is for stat in terms of employability, length of program
I haven't looked into other masters programs, but if this one is good and I know other people staying at Cal Poly that I like, I'll be interested.

Survey of Alumni

In your opinion, how would an M.S. in Statistics change an applicant's opportunities at your place of work?
An M.S. in (Bio)statistics with a focus on healthcare is required at a minimum for the majority statisticians at the City of Hope.
The amount of departments that they would be applicable would expand, and their starting level would likely be higher.
Having an M.S. in Statistics would give the applicant a much greater chance of being hired above Entry Level status and allow an applicant to be hired into a more technical position.
You can not apply without a Masters at a minimum.
Depending on the job they are applying for it would greatly increase their chances of getting the position. Many of my colleagues have a graduate degree of some kind.
We only have a few jobs that are specifically for statisticians. But it would greatly increase your possibility of getting such a job.
An M.S. in statistics would likely result in higher pay and more responsibility at my place of work.
Where I was before getting my PhD someone without a masters wasn't considered.
Within my company statistics is not necessarily a sought after field, the fact a potential hire has the "MS" title is an advantage merely because it is a higher level of education and knowledge.
It is a requirement to have a MS in statistics or related field
Would greatly increase an applicants chances or being offered the position. At my place of work however, a M.S. in Statistics would not increase an applicants chances any more than an MBA would.
it would increase opportunities
Work in a slightly different department doing slightly different work on the same project.
All positions on my biostatistics team require an M.S. in biostatistics or statistics to be eligible for hire.
Entry level actuarial work is highly competitive in the SF bay area. It may make the candidate stand out if the applicants have the same # of exams.
It is incredibly helpful to have an MS in statistics. It shows intelligence and a willingness to work. It also shows that an applicant thinks like a masters student.
A minimum of MS is required for the statistician title, although we do offer Research Assistant positions to BS of all type (and obviously BS in Statistics candidates have more opportunity for us than a BS in psych, chem, history, english, etc..)

SUPPLEMENT 3

Reduces the number of years of professional experience needed to reach same position as someone with a BS only
It would open more doors to research level jobs and things like experimental design.
In our company, having a Masters does not increase your chances of hire much, and is not required to work your way up in the company.
More opportunities to start at a higher position/pay. Easier to get interviews directly out of college with a master's degree
I still like to have an MS or greater when hiring a Data Scientist - I need to have an individual comfortable with going deeper into the theory behind the algorithms & have a better-rounded statistical knowledge + a little more seasoning in discussions with our customers ; there are ML engineer roles that require more programming and less theory and for that, a BS is sufficient.
When hiring me they did not seem to put much weight on specific high degrees but rather knowledge and interest
The applicant would have a better opportunity working in the data analytics group of our actuarial practice.
Responsibilities change and a faster path to project forward.
Greatly improve.
It would help you meet the qualifications for data science/statistics related roles.
Applicants with a Masters degree would be more qualifies for the advanced analysis teams rather than the business analysis teams. They would have more opportunity and be able to pick which field they would want to be in.
more analysis-related opportunities, more contributions to reports/manuals/publications
You may be overqualified and salary expectations may not be in line with reality.
We only offer roles as Biostatisticians to Applicants with MS degrees. Anyone with an undergraduates degree is welcome to apply for any of the programming positions.
We don't hire analysts without at least a M.S. in a quantitative discipline. It would greatly increase the applicant's opportunities.
A monumental change. Applicants with only a B.S. are barely considered, an M.S. is pretty much required at this point.
While I've been in academia for the last 5 years, the previous 14 years were in private sector and federal govt. In both cases I think a BS only would be a tough sell for hiring unless the candidate had a lot of practical experience (5+ years of demonstrated high quality work and a healthy toolbox)
i would hope they have stronger knowledge in statistics, and their resume would more easily get through to the recruiters
A master's allows opportunities in more sectors the company is involved in
For a data science position a MS would at least get your foot in the door.
Hard to say.
I lead a program for graduate students in statistics, in which I recruit, hire, and train them for full-time employment as research statiscians. When I'm presenting on campus, I make it clear that the ticket for entry into our advanced analytics groups is a Master's.
Today, machine learning and statistics are considered a specialization requiring focused training, so having a MS reduces the friction in the hiring process where you must explain your level of education and expertise in the subject.
Negligible impact
The depth of knowledge and critical thinking, in general, is higher from those with Master's than those with just a Bachelor's. Also, at least in data science, most job reqs require a PhD with a Master's being entry level.

For data engineering or business reporting, a bachelors and business domain knowledge can go far. Data science and machine learning relies on the ability to stay up to date with recent advancements, only accessible through graduate level research papers and discussions. A lot more computer science is necessary as well.

Top of the list of applicants

We hire both levels of education. Masters level applicants are typically much stronger and we want more , but we take a lot of BS applicants to fill in teams of analysts. We have drastically expanded the size of our data team in the last year.

An MS would show that the applicant has a high capability to learn and be taught new concepts. My department focuses on a Analytics and Reporting which requires statistical literacy, mainly in the form of providing good and informative data visualizations.

It really depends on the level of the position...

Depends on actual work experience as well. Someone with a BS and more work experience is weighted heavier than someone with an MS but no work experience.

As a high school teacher, I would additionally qualify to teach at a community college.

An elevated starting position, higher starting salary, more autonomy

They would have more opportunities, they would be considered for more technical roles (Data scientist as opposed to just analyst)

All data scientists (other than me) hold at least an M.S., I do not think that applicants with only a Bachelor's degree are considered for data scientist positions at this point.

For the most part, it would not change an applicant's opportunities. Our firm is more interested in progress with actuarial exams than an M.S in Statistics.

I work in a small department within Callaway Golf where only 1 manager is needed. Therefore, at this moment a masters in statistics would not help an applicants considerably.

might be my own personal bias, because i don't think my masters (from UCSB) did much for me in terms of my ability to do my job incrementally beyond what I got from poly, but for me whether someone has a MS or not wouldn't have much bearing on my likelihood of getting them past the resume status or affect my hiring decision.

Opportunity for a larger starting income

In the Bay Area, your prospects change dramatically when you have a Masters degree. Many positions require it, and even if they don't the pay will likely be much higher. I think that if you are going for a highly technical position in SF it's becoming more of a requirement.

More leverage for higher pay

We look for applicants who have a wide breadth of education and experience, but a Master's degree in Statistics could only be beneficial. As we strive to be a more data-driven organization I could see this being even more impactful in the future.

It probably wouldn't - this might be a rare case but I am one of two Data Scientists in my company, neither of us has Master's degrees, but I could see how they might be helpful. However this is a startup company, they saw me as an asset not only because of my background in Statistics but also my personality, which is a major factor in a small company. I had applied to larger companies in the past and in those cases, the Master's Degree stands out more and seems more of a requirement. So it definitely would open doors for some folks.

More time to learn about theory of stats. Under grad seems like such a small slice of the pie

It would give them a greater chance to be hired. In my company the incentive is that they can immediately be billed out at a higher rate than those without a masters degree. (Therefor they should also get a higher starting salary even with no industry experience.)

Pay grade and types of consultations assigned. Because I have a B.S. in statistics, I'm on a separate

career track than those who have an M.S. (which includes slightly lower pay). Also projects involving large grants, for example, are usually given to statisticians with a graduate degree or more experience.

In my work, a masters degree is less about statistical rigor and rather more about the applicants character, work ethic and commitment to the analytical space. In some cases though, a masters could be a deterrent if the applicant lacks job experience which points to the importance of internships or industry experience between an undergrad and master programs.

N/A, I'm not pursuing a career in statistics at the moment. However, I think it would absolutely change opportunities for any statistics-related career.

They would have more opportunities and a higher degree of autonomy on analysis

Yes, it would allow for a wider range of positions

Not too much. Maybe a little increase of odds.

Open up avenues to different departments of the company, to more advanced positions.

I hire for entry level positions that do not require any kind of Masters degree. If my company was specifically looking for a statistician or high level data analyst, an applicant with a MS in Statistics would be much more desirable than one without an MS.

No current place of work to comment on. However, in most jobs I have looked at a Master's degree seems to be the equivalent of 2+ years of work experience (i.e. jobs require 2+ years of experience OR a Master's degree).

It may help achieve a higher position potentially but the company I work for is small so I'm not sure how much of a difference a master's degree would make.

One would likely be able to move up and around departments more.

Hard to say, for actuaries it wouldn't make much of a difference, but for data science/analytics roles it could benefit them

If they did not have actual work experience in analytics at a company, then a person with an M.S. in Stats would be better than a B.S. in Stats, but 2-3 years working in stats/data/analytics will win over an M.S. in Stats and no work experience.

We would be able to allow someone to do work fairly independently of us, not a lot of supervision would be necessary.

College of Science and Mathematics
Office: 805-756-2226
Fax: 805-756-1670
cosam@calpoly.edu
cosam.calpoly.edu

CAL POLY

Academic Senate Curriculum Committee
California Polytechnic State University

Dear Academic Senate Curriculum Committee,

This is a letter to indicate support for the Masters of Science in Statistics program that has been proposed by the Statistics Department in the College of Science and Mathematics at California Polytechnic State University.

This program is seen as a strong extension of our undergraduate Statistics program, as well as a complement to our cross disciplinary studies minor (CDSM) in Data Science, which is a joint program between our Statistics Department and the Computer Science Department in the College of Engineering. The proposed program is applied in nature and follows our university's philosophy of learn-by-doing. It was explicitly designed to foster the growth of our existing undergraduate and graduate programs by providing new professional pathways in this highly sought out field and faculty expertise to enhance our existing degree programs.

The MS in Statistics program has been well mapped out, the rational is solid, the proposal is strong with good documentation of the need and marketability of the program. The quality of the program is undergirded by the faculty of our Statistics Department, who are well known and respected nationally, having made significant contributions to their scholarly disciplines and having deep engagement in classroom instruction. Moreover, Hanover Research conducted a thorough market analysis reporting that this program is in high demand by both students and industry.

Taken together, we are very supportive of this MS degree program and have allotted the resources to make it a success. Indeed, we successfully recruited this year a new faculty member that will contribute to the program and as we move beyond the budget challenges presented by COVID-19 pandemic the MS in Statistics is among our college's highest prioritized programs for adding additional faculty. We believe we can make that happen and we feel strongly that this program will benefit the entire University, by attracting new students and making them more employable. We are happy to follow up for any questions or clarifications needed.

Thank you,

Dean Wendt
Dean, College of Science and Mathematics
California Polytechnic State University

Kellie Green Hall
Associate Dean
College of Science and Mathematics

M.S. Statistics – Degree Flowcharts

Pre-requisite map of remedial courses, 400-level required courses, 500-level required courses, and new 500-level Electives:

Example Paths to Degree

2-year with maximum 12 credit remediation

	Fall	Winter	Spring
Year 1	- Stat 425 - Stat 331 - Stat 334	- Stat 426 - Stat 323 - Stat 550	- Stat 427 - Stat 466 500-level elective
Year 2	- Stat 566 - Stat 551 - Stat 590	- Stat 590 500-level elective - Stat 599	- Stat 590 - Stat 599

2-year without remediation

	Fall	Winter	Spring
Year 1	• Stat 425 • Stat 551	• Stat 426 • Stat 550	• Stat 427 • Stat 466 • 500-level elective
Year 2	• Stat 566 • 500-level elective • Stat 590	• Stat 590 • Stat 599	• Stat 590 • Stat 599

Blended program

Taken during B.S., as part of 180-credit degree requirement:

Stat 425, Stat 426, Stat 427, Stat 466

Taken during B.S., not counted towards 180-credit degree requirement:

6 electives (of which two must be 500-level)

Taken during M.S. graduate standing:

	Fall	Winter	Spring
Year 1	• Stat 551 • Stat 566 • Stat 590	• Stat 550 • Stat 590 • Stat 599	• Stat 590 • Stat 599

	Requisition Number:504467

REQUISITION INFORMATION

Internal Team: SL-CSM-Statistics - 115300

Recruitment Process:*   SL - Faculty Tenure Track

Job Code/Employee Classification:*   Instr Fac AY

 Job Code: 2360

Salary Range/Grade:*   2360-ASSISTANT PROFESSOR-Grade-3

 Minimum: $ 5,046.00
 Maximum: $ 11,197.00
 Pay Frequency:

CSU Working Title:*   Tenure Track Position - Statistics

Campus:*   San Luis Obispo

Division:*   Academic Affairs-Provost

College/Program:*   CSM-College of Science & Math

Department:*   CSM-Statistics - 115300

Requisition Number: 504467

OPEN POSITIONS

Positions:*

Position no	Type:*	Applicant	Application status
1 New Position # Request	New	-	-
Position no: SL-00011032			

REQUISITION DETAILS

Reason:*   New Position

SUPPLEMENT 6

Justification for Recruitment:*

The Statistics Department would like to recruit for one or more tenure-track faculty members to begin in Fall 2021 to support the development of our proposed MS program as well as campus-wide data science efforts. Expectations for both positions include high-quality teaching of courses in Statistics (major, service, and support courses) and engagement in continuing scholarly work and professional development.

These positions are necessary for three reasons. First, we need additional faculty experience and expertise to assist with the delivery of the Cross-Disciplinary Minor in Data Science; and, if approved by the Academic Senate next Fall, the Cross-Disciplinary Minor in Bioinformatics. Our department is collaborating closely with Computer Science on both of these programs. We have three faculty members extensively contributing to these programs: Kelly Bodwin, Hunter Glanz, and Dennis Sun; however, with the growth of interest in our DATA and computing courses (and our major in general) we are having difficulty meeting demand with only these three faculty delivering the computing portions of our curriculum.

Second, we have proposed an M.S. program in statistics that is ready for final campus approval and Chancellor's office review. Our ability to deliver the proposed curriculum is contingent on a commitment to hire an additional needed tenure-line faculty member.

Third, we continue to offer more and more sections of Statistics courses to more and more students. Many of these students are in service and support courses, but we've also seen a marked increase in the number of students taking upper-level courses for Statistics majors and minors in the past few years (see tables below). In particular, the number Statistics majors, and the number of students taking our 300-level courses for Statistics majors and minors, has more than tripled in the past eight years. Our ability to meet demand with qualified part-time faculty is extremely difficult, largely due to our somewhat remote location and high cost of living on the Central Coast. Another tenure-track faculty member is essential to help with meeting student demand for courses.

To see the following tables, please refer to the document attached on the "Documents" tab.

Table 1: Student Credit Units (SCUs) taught by Statistics in Fall with faculty headcounts and tenure density. Note listed year is Dashboard AY, so 2012 refers to Summer 2011 – Spring 2012. (hc = headcount)
Over this period (2012-2021) five TT faculty separated from the department prior to going up for tenure. One faculty separated due to being denied tenure.

Table 2: Enrollments in courses that heavily support our minors in statistics and data science: STAT 325/305 (Introduction to Probability and Simulation), STAT 313 (Applied Experimental Design and Regression Models) STAT 323 (Experimental Design and Analysis), 324/334 (Applied Regression Analysis), STAT 330 (Statistical Computing with SAS), STAT 331 (Statistical Computing with R), and STAT 419 (Multivariate Analysis). Note listed year is Dashboard AY, so 2012 refers to Summer 2011 – Spring 2012.
* Due to budget concerns, we reduced planned offerings of several courses that support our minor this year.

Table 3: Number of STAT majors. Note listed year is Dashboard AY, so 2012 refers to Summer 2011 – Spring 2012.

During COVID, in 2020-21, we had 138 students with declared minors in statistics, 13 in Actuarial Science, and 46 in the Cross-Disciplinary Studies minor in Data Science. These number are similar to counts from 201-20 where we had140 students minoring in Statistics, 25 minoring in Actuarial Science Preparation, and 53 in the Cross-Disciplinary Studies minor in Data Science. We had In contrast, in 2016 we had 54 students minoring in Statistics and only 3 minoring in Actuarial Science. Our Data Science program was only just introduced and had no official students at that time. We continue to expect that the number of students interested in pursuing undergraduate majors in Statistics will continue to increase in coming years, based on the rapidly increasing numbers taking AP Statistics and very favorable employment prospects.

Previous/Current Incumbent:	--
Work Type:*	Instructional Faculty – Tenured/Tenure-Track
Hiring Type:*	Probationary
Job Status:*	Regular
Time Basis:*	Full Time
Hours Per Week:	--
FLSA Status:	Exempt

Job Summary/Basic Function:

The Statistics Department in the College of Science and Mathematics at California Polytechnic State University, San Luis Obispo, is seeking a full-time, academic year, tenure-track position, with appointment beginning September 12, 2022. Appointment at the Assistant Professor rank is anticipated; higher ranks will be considered. Rank and salary are commensurate with qualifications and experience.

Primary responsibilities will include teaching undergraduate statistics classes to non-statistics majors as well as teaching introductory and upper-level statistics and data science classes for statistics majors and minors. If a proposed master's program in statistics is approved, responsibilities may also include teaching master's level statistics courses and supervising graduate students.

It is expected that the successful applicant is committed to quality undergraduate and master's level teaching, continued scholarly activity, and service to the University. Candidates with an interest in and ability to pursue scholarly projects with students at both the bachelor's and master's level are preferred. Applicants with data science and computing experience are especially encouraged to apply.

Minimum Qualifications:
--

Required Qualifications:
- Ph.D. in Statistics or closely related discipline.
- Demonstrated experience and commitment to student-centered learning and teaching, as well as the ability to collaboratively work in multidisciplinary settings.
- Demonstrated proficiency in written and oral use of the English language.

Preferred Qualifications:
- Experience with data science and computing.
- Experience in working with diverse populations and fostering a collaborative, supportive and inclusive environment.

Special Conditions:

The person holding this position is considered a 'mandated reporter' under the California Child Abuse and Neglect Reporting Act and is required to comply with the requirements set forth in CSU Executive Order 1083 as a condition of employment.
Following a conditional offer of employment, a background check (including a criminal records check) must be completed satisfactorily before any candidate may start work with Cal Poly, San Luis Obispo. Failure to satisfactorily complete the background check may result in the withdrawal of the offer of employment. Note: Cal Poly cannot deny an applicant a position solely or in part due to a criminal conviction history until it has performed an individualized assessment and linked the relevant conviction history with specific job duties in the position being sought.
Please note: Current employees who are offered positions on campus will be required to undergo a background check for any position where a background check is required by law or that Cal Poly has designated as sensitive. Sensitive positions are those requiring heightened scrutiny of individuals holding the position based on potential for harm to children, concerns for the safety and security of people, animals, or property, or heightened risk of financial loss to Cal Poly or individuals in the university community.
For health and well-being, Cal Poly is a smoke & tobacco-free campus. The university is committed to promoting a healthy environment for all members of our community.

License / Certifications:
--

Supervises Employees:*
○ Yes ◉ No

Mandated Reporter:*
Limited - The person holding this position is considered a limited mandated reporter under the California Child Abuse and Neglect Reporting Act and is required to comply with the requirements set forth in CSU Executive Order 1083, revised July 21, 2017.

Conflict of Interest:*
None

NCAA:
○ Yes ◉ No

BUDGET DETAILS

Benefit Eligible?:
◉ Yes ○ No

Anticipated Hiring Range:
--

Budget/Chart field/Account string:
SL001-115300

Pay Plan:
AY

Pay Plan Months Off:
--

POSTING DETAILS

Posting Type:*
Open recruitment

Review Begin Date: Oct 11, 2021

Advertising Summary:*   The Statistics Department in the College of Science and Mathematics at California Polytechnic State University, San Luis Obispo, is seeking a full-time, academic year, tenure-track position, with appointment beginning September 12, 2022. Appointment at the Assistant Professor rank is anticipated; higher ranks will be considered. Rank and salary are commensurate with qualifications and experience.

Advertisement text:*

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It is expected that the successful applicant is committed to quality undergraduate and master's level teaching, continued scholarly activity, and service to the University. Candidates with an interest in and ability to pursue scholarly projects with students at both the bachelor's and master's level are preferred. Applicants with data science and computing experience are especially encouraged to apply.

At California Polytechnic State University, San Luis Obispo, we believe that cultivating an environment that embraces and promotes diversity is fundamental to the success of our students, our employees and our community. Bringing people together from different backgrounds, experiences and value systems fosters the innovative and creative thinking that exemplifies Cal Poly's values of free inquiry, cultural and intellectual diversity, mutual respect, civic engagement, and social and environmental responsibility. Cal Poly's commitment to diversity informs our efforts in recruitment, hiring and retention. California Polytechnic State University is an affirmative action/equal opportunity employer.

Required Qualifications

- Ph.D. in Statistics or closely related discipline.
- Demonstrated experience and commitment to student-centered learning and teaching, as well as the ability to collaboratively work in multidisciplinary settings.
- Demonstrated proficiency in written and oral use of the English language.

Preferred Qualifications

- Experience with data science and computing.
- Experience in working with diverse populations and fostering a collaborative, supportive and inclusive environment.

Special Conditions

The person holding this position is considered a 'mandated reporter' under the California Child Abuse and Neglect Reporting Act and is required to comply with the requirements set forth in CSU Executive Order 1083 as a condition of employment.

Following a conditional offer of employment, a background check (including a criminal records check) must be completed satisfactorily before any candidate may start work with Cal Poly, San Luis Obispo. Failure to satisfactorily complete the background check may result in the withdrawal of the offer of employment. Note: Cal Poly cannot deny an applicant a position solely or in part due to a criminal conviction history until it has performed an individualized assessment and linked the relevant conviction history with specific job duties in the position being sought.

Please note: Current employees who are offered positions on campus will be required to undergo a background check for any position where a background check is required by law or that Cal Poly has designated as sensitive. Sensitive positions are those requiring heightened scrutiny of individuals holding the position based on potential for harm to children, concerns for the safety and security of people, animals, or property, or heightened risk of financial loss to Cal Poly or individuals in the university community.

For health and well-being, Cal Poly is a smoke & tobacco-free campus. The university is committed to promoting a healthy environment for all members of our community.

About the Department

The foremost mission of the Statistics Department at Cal Poly is high-quality teaching. The Statistics Department offers a B.S. in Statistics and also minor programs in statistics, data science, and actuarial preparation. An M.S. in Statistics is under review and may begin enrolling students as soon as September 2023. The department also provides support courses for most majors at Cal Poly, as well as some graduate programs, and contributes many courses to the general education program. In support of campus scholarship activities, the department also runs a statistical consulting service. The department faculty is comprised of 20 tenured/tenure-track faculty and 10 lecturers.

About the University

Founded in 1901, Cal Poly is one of only five comprehensive polytechnic universities in the nation, with approximately 22,000 undergraduates, 120 postbaccalaureate, and 900 graduate students. U.S. News and World Report has ranked Cal Poly #1 among public master's universities in the western United States for 28 consecutive years. A primarily undergraduate university, Cal Poly offers academically focused students 66 baccalaureate degrees and 27 master's degrees. Operating on the quarter calendar system, Cal Poly takes pride in its "Learn-by-Doing" approach to teaching and learning, which has characterized Cal Poly since its founding. One of the 23 campuses of the California State University system, Cal Poly has a statewide mandate as a polytechnic university. Cal Poly is one of the largest land-holding universities in the nation and uses all of its land holdings in active support of its educational programs. Cal Poly is located in historic San Luis Obispo, a city of 47,000, 12 miles from the Pacific Ocean and midway between San Francisco and Los Angeles on California's scenic Central Coast. With excellent public education resources, recreational facilities and an expanding dedication to the arts, the area is known for its scenic landscapes and extraordinarily temperate climate.

How to Apply

Interested candidates must attach (1) a cover letter, (2) resume/curriculum vitae, (3) diversity statement, (4) teaching philosophy statement, (5) research statement, and (6) a copy of unofficial graduate transcripts. Please be prepared to provide three professional references with names and email addresses when completing the online faculty application. Review of applications will begin October 13, 2021 and will continue until the position is filled.

SEARCH DETAILS

Search Committee Chair: Karen McGaughey

                                                 Email address: kmcgaugh@calpoly.edu

Search Committee Members:

Recipient

SL-CSM-Statistics - 115300:

Kelly Bodwin

Matthew Carlton

Ulric Lund

Karen McGaughey

Andrew Schaffner

Jeffrey Sklar

SELECTION CRITERIA

❶ There are no items to show

USERS AND APPROVALS

Administrative Support: Kimberly Barton

                                                 Email address: kabarton@calpoly.edu

Compliance Panel Facilitator: --

                                                 No user selected.

Additional viewers:

Recipient

                                                 No Additional viewers selected.

Hiring Administrator:*   Cassie Stevenson

                                                 Email address: csteve03@calpoly.edu

Approval process:*   SL - Faculty Tenure Track Archived 2021

1. Department Head/Chair: Andrew Schaffner ✔ Approved Aug 30, 2021

2. College Personnel Manager: Sharon Arnold ✔ Approved Aug 31, 2021

3. College Budget Manager: Derek Gragson ✔ Approved Aug 31, 2021

4. Dean: Dean Wendt ✔ Approved Aug 31, 2021

5. OUDI: Denise Isom ✔ Approved Aug 31, 2021

6. Provost Budget Review: Edward Rainbolt ✔ Approved Sep 13, 2021

7. Provost :   Cynthia Jackson-Elmoore ✔ Approved Sep 13, 2021

8. Academic Personnel Representative: Jennifer Myers ✔ Approved Sep 13, 2021

HR/Faculty Affairs Representative:*   Jennifer Myers

                                        Email address: jmyers@calpoly.edu

[Powered by PageUp](#)

From: John Hausaman <jhausaman@wscuc.org>
Date: Thursday, January 23, 2020 at 11:51 AM
To: Bruno Giberti <bgiberti@calpoly.edu>
Subject: Substantive Change Screening Determination: No further review of program needed

WASC Senior College and University Commission

Dear ALO:

Thank you for submitting the Substantive Change Screening form. Following a review of the information submitted, it has been determined that no substantive change review will be necessary for the proposed program.

Program Implementation Notification Required
You are required to confirm implementation of the program in order for the program or location to be listed on the WSCUC website for purposes of financial aid eligibility verification by the U.S. Department of Education.

Login to the Accreditation Management Portal and the Master of Science in Statistics as Active within 30 days of implementation. Failure to report implementation may result in the suspension of financial aid eligibility for enrolled students.

SUPPLEMENT 7

MEMORANDUM

3/3/22

TO: Andrew Shaffner, Chair, Statistics department
FROM: Joe Borzellino, Director of Enrollment Planning and Management
SUBJECT: Physical Space assessment of MS Statistics proposal

The following is a brief physical space assessment for the proposed MS in Statistics. The review is based on the submitted proposal in addition to email correspondence with the team in Statistics responsible for the proposal.

Office Space:

1. CSM has indicated that they have private faculty office space for the two new tenure-track positions they have hired.
2. Graduate Students will not need office space as they will not be serving as TAs. They will share existing collaboration/research space already assigned to CSM.

Classroom/Lab Space:

1. Proposers have indicated that in addition to their existing studio lab in 38-123, CSM is providing a new shared space 180-272 to accommodate the increase in sections offered to support the MS program.
2. Proposers indicate that they expect 2-4 additional sections per year of elective statistics courses may need to be offered in university classrooms depending on student choice. Undergraduates enrolling in these sections as electives will bring some efficiency.

Summary: Given that CSM has committed to providing most of the instructional space needed to support this proposal, there is minimal impact on university space resources. Statistics has indicated, however, that should demand for their data science curriculum grow they will have a need for an additional studio lab space. Such a space has not been identified by CSM, and until such a space is identified, management of any such increased demand may be necessary to limit adverse impacts on the MS program and existing university space resources.

SUPPLEMENT 8

To: Andrew Schaffner, Professor, Statistics Department Chair
Date: March 1, 2022
From: Jeanine Scaramozzino, College of Science and Mathematics Librarian
Subject: Library Resources Supporting Proposed MA in Statistics

SUMMARY

The library's existing collections and selection practices will support the proposed MS in Statistics. The curriculum proposal states that required admission to the program and degree course requirements are currently being offered within the university in Statistics, Mathematics, and Computer Software Engineering. The licensed campus GIS and data software and library licensed data sources, reference, and infrastructure support can accommodate the needs of this program. The library's current collections budget and resources will support existing courses and may accommodate new quarter and semester Statistics courses; however, give the current budget climate is it unlikely that the library will be able to increase or enhance licensing of additional information resources for this program.

DESCRIPTION OF COLLECTIONS SUPPORTING DEGREE

Books and Journals
Collection development practices favor online materials to increase accessibility of information. In addition, Cal Poly students may borrow ebook chapters and journal articles through Interlibrary Loan Services. Physical books may be borrowed through CSU+ and books not available through CSU+ may be ordered through Interlibrary Services. The primary core and supporting Library of Congress Subject Headings include: HA – Statistics, HD – Include Business Consulting, Q – Science (General), QA – Mathematics, QA75.5-76.95 -Computer Science.

The library has a core collection of ebooks (16,765 titles), print books (1,107 titles), e-journals (686 titles), and print journals (9 titles) in subjects that support a Master's of Science in Statistics specifically preparing students in careers in statistics and data analysis.

Scholarly Databases and Additional Electronic Resources
The library offers the following databases and resource packages to support the program. With additional content resources listed in the topical research guides listed below. Articles that are not available directly from the library may be ordered by students, staff and faculty through Interlibrary Loan Services. Cal Poly and the Chancellors Office provision electronic resources that enable text and data mining (TDM) projects. Researchers may contact the library concerning eligible databases and any publisher requirements for TDM projects.

Topical Research Guides:

- Mathematics & Statistics: https://guides.lib.calpoly.edu/math
- Computer Science: https://guides.lib.calpoly.edu/csc
- Science Resources: https://guides.lib.calpoly.edu/cosam
- Data Sources & Repositories: https://guides.lib.calpoly.edu/datasources
- Government Information and Resources: https://guides.lib.calpoly.edu/governmentinformation

First Line Resources for Math and Statistics:

- Web of Science (All Databases)
  Web of Science All Databases (1864-present) provides the most comprehensive results from +10 databases that primarily cover the sciences plus social sciences and humanities. Databases include the following and more: Science Citation Index (1955-present); Social Sciences Citation Index (1956-present; Emerging Sources Citation Index (2015-present); and Arts & Humanities Citation Index (2004-present).
- MathSciNet via EBSCOhost
  MathSciNet is a searchable database of reviews, abstracts and bibliographic information for mathematical sciences literature, including journals, conference proceedings, and books.
- arXiv.org
  arXiv is a curated research-sharing platform hosting nearly two million scholarly articles in the fields of physics, mathematics, computer science, quantitative biology, quantitative finance, statistics, electrical engineering and systems science, and economics. arXiv offers researchers a broad range of services: article submission, compilation, production, retrieval, search and discovery, web distribution for human readers, and API access for machines, together with content curation and preservation. This source provides in-progress research, preliminary data, etc. that has NOT been peer-reviewed. This platform allows for other researchers to comment and ask questions about the research before it is ready for formal publication.

First Line Resources for Data/Data Sets:

- Statista
  Statista is a statistics portal which provides direct access to quantitative data on media, business, finance, politics, and a wide variety of other areas of interest or markets. The database features unlimited downloads, source citations and direct use or export of results in PowerPoint, Excel PDF and Graphic (PNG) formats.
- RAND California
  RAND California provides information, research reports and statistics on the California economy and public policy issues, as well as access to selected policy reports, statistics, and information at the national and international scale.
- Dataset Search via Google
  Dataset Search is a search engine for datasets. Using a simple keyword search, users can discover datasets hosted in thousands of repositories across the Web.
- Data.gov
  The home of the US government's open data. A comprehensive index of datasets from the US government, including other state, local, and international

agencies. Includes tools and resources to conduct research, develop web and mobile applications, design data visualizations, and more.

First Line Resources for Computer Software Engineering:

- Engineering Village (Compendex)
  Compendex is a comprehensive bibliographic database of scientific and technical engineering research, covering all engineering disciplines. It includes millions of bibliographic citations and abstracts from thousands of engineering journals and conference proceedings.
- IEEE/IET Electronic Library (IEL)
  The IEEE/IET Electronic Library provides access to full-text documents from publications in electrical engineering, computer science, telecommunications, electronics and related disciplines, including journals, ebooks, standards, and conference proceedings from the Institute of Electrical and Electronics Engineers (IEEE), the Institution of Engineering and Technology (IET), John Wiley & Sons, and MIT Press.
- O'Reilly Online Learning
  Formerly known as Safari Books, O'Reilly Online Learning provides access to professional books on topics including UX design, leadership, project management, teams, agile development, analytics, and core programming. In addition to ebooks, learning paths, case studies, and video courses are available.

cc: Tim Strawn, Executive Director, Collection Strategies, Access & Systems
Katherine O'Clair, Associate Dean for Academic Services
Adriana Popsecu, Dean, Library Services
Sarah Lester, CENG Librarian

MEMORANDUM

To: Thomas Gutierrez
Chair, Academic Senate

From: Jeffrey D. Armstrong
President

Date: June 29, 2022

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Andrew Schaffner
Cem Sunata
Christine Theodoropoulos
Andy Thulin
John Walker
Dean Wendt
Philip Williams

Subject: Response to AS-937-22 Resolution on New Degree Program for Masters of Science in Statistics

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I am pleased to approve the above-entitled Academic Senate resolution. The proposal will now be sent to the Chancellor's Office for approval.

Please extend my appreciation to the Academic Senate Executive Committee and the Statistics Department Faculty for their attention to this matter.