TO: The Academic Senate
FROM: Committee on Instruction and Curriculum (CIC)
SUBJECT: 16-17 CIC 41: Revision request for B.S. Statistics

PURPOSE: Information to the Academic Senate

ACTION REQUESTED: That the Senate accept the information that the revision request for bachelors of science in Statistics has been approved by CIC.

BACKGROUND INFORMATION:
The Senate process for approving transformed degree programs for the semester calendar is defined by 14-15 CIC 36. The Committee discussed the B.S. in Statistics at its November 14 meeting, which was attended by a representative of the Department: Mitchell Watnik, who is also a member of the Committee. It was approved by CIC unanimously with the acknowledgement that some non-substantive changes may occur in the Catalog copy. The Committee recommended striking the language about “departmental honors” and the Department said it would comply. The proposal may be viewed within Curriculog; the summary is attached as a PDF document per ExCom’s request.
Statistics (B.S.) 120 units

2. Semester Conversion Request for Approval of Revision of the Undergraduate Degree Program/Major

General Catalog Information

Select Shared Core unless otherwise instructed by APGS

Select SHARED CORE*
- Program
- Shared Core

Year: Fall 2018
Catalog: 2018-2019

Notes: If you want to move an existing degree program to online (i.e. 50% or more of the program can be completed online (a hybrid course counts as .50 online), elevate an option to a degree, or change the degree type, please e-mail Donna Wiley, Interim Associate Vice President, Academic Programs and Graduate Studies; and copy Sarah Aubert, Catalog and Curriculum Specialist, Academic Programs and Graduate Studies, for additional instructions as soon as possible.

Department:* Department of Statistics and Biostatistics

Full and exact title of Major including degree earned:* Statistics (B.S.) 120 units

Has your program received transformation funding?*
- Yes
- No

If the program received transformation funding, please summarize the transformative changes made:
We have modernized, added, and transformed courses. New courses include an emphasis on data science (STAT 451 and STAT 452), as well as other new modern courses. We have changed the area of emphasis to separately allow for use of CS courses to complement the data science electives in the Department.
Program Description

Statistics is the science of learning from data. Majors study collecting and analyzing all kinds of data, and reporting the results of the analysis. Designs of Experiments are used to plan data collection in experimental settings, such as in medical research. Surveys are used to collect opinions from samples in populations, such as in political polling. Observational data is collected commonly by business as part of standard business processes, such as in website analytics. Statistical methods are used to process data into easily read visual displays, and into summary statistics for interpretation, decision making, and reporting.

Statistics has been a rapidly growing science for many years and has many uses in other fields, such as Econometrics, Business Analytics, Machine Learning, and Visualization. Statistics is widely used by businesses and government organizations to understand changes in the economy and to make forecasts about future events based on past patterns in their data. Statistics is used to model relationships between variables and to predict future values of output variables from input variables. Statistical methods draw accurate inferences about large groups on the basis of a representative sample from the group or population. Descriptive Statistics are used to summarize and visualize the collected data.

The methodology of statistics can be adapted to many types of problems. Due to the extensive development of computers and the collection of large databases, the need for statistical techniques has greatly expanded in recent years. A society like ours, which has become increasingly dependent on its data, has a growing need for statisticians.

Student Learning Outcomes

Students graduating with a B.S. in Statistics from Cal State East Bay will be able to:

Apply basic computational skills in descriptive statistics and data visualization, hypothesis testing, confidence intervals, modeling and error analysis, including the use of large data sets.

Analyze data using appropriate software, including cloud-based software, and to interpret results covering descriptive statistics and data visualization, hypothesis testing, confidence intervals, modeling and error analysis, including the use of large data sets.

Communicate to others results involving descriptive statistics and data visualization, hypothesis testing, confidence intervals, modeling and error analysis using reproducible research best practices.
Acquire data using methods of design of experiments, survey sampling, or observational data, including data scraping and data wrangling from open source data and free data sources.

Career Opportunities

Actuary
Biostatistician
Business Analyst
Census Analyst
Credit Analyst
Customer Analytics Specialist
Data Analyst
Data Manager
Data Scientist
Economist
Educational Researcher
Financial Modeler
Information Systems Analyst
Marketing Analytics Specialist
Quality Control Specialist
R programmer
Research Statistician
Sales Analyst
SAS Programmer
Sports Analyst
Statistician
Survey Designer
Systems Analyst
Teacher

Preparation

For Advanced Placement course equivalencies, see the Registration chapter.

The theory of statistics rests on a mathematical foundation. Even for statisticians whose primary interest is in applications, challenging mathematical problems arise continually. Calculus and computer programming are required for the major. An elementary course in linear algebra is highly recommended.

Courses in areas to which statistics is applied will also be helpful. Examples are business, biology, chemistry, geography, social sciences, psychology, and physics.
Community college students are advised to complete the lower division requirements for the major before transferring to Cal State East Bay.

Credit/No Credit Courses

It is the policy of the department that no course taken on a "CR/NC" basis may be applied toward any of the Upper Division Core requirements. Individual petitions for waiver of this policy will be treated according to the same procedures as petitions to waive other degree requirements.

Double Major

A knowledge of statistical methods is of increasing importance to students in many areas, especially the physical, computing, decision, environmental, biological, and social sciences and administrative studies (including business, health care, and education). A second major in statistics along with a major in one of these areas may result in better preparation for employment or graduate study. The following three factors combine to make such a double major feasible in many cases:

The Statistics major allows for a relatively large number of completely unrestricted elective units. The student may elect courses required for the other major among these. Up to fifteen units in certain areas outside of Statistics may be applied toward the Statistics degree. (See Area of Emphasis requirement, 4.) Some other majors require Statistics courses that also count towards the Statistics major (e.g., STAT 310, STAT 303, STAT 320, STAT 330, etc.).

Contact an advisor to develop a clear plan for completing the major.

Please read before completing Major Requirements Section

Instructions:

Start with the View Curriculum Courses icon directly beneath the Major Requirements field. Select the Add Courses button to enter each individual course that will be used in your Major Program. (Include the Course Units in the Course Title (name) field for review by campus committees).

Next select the View Curriculum Schema icon (to the left of the Curriculum Courses icon). Select Add Core to build the headers and requirements for your catalog page. i.e. add headers for Prerequisites, Core Requirments, Electives, Capstone. (If you have a concentration(s), add a core titled Concentrations and
list only the total concentration units. You do not need to list each individual concentration.) Please remember to include total units in core headers.
Preview your catalog chapter by selecting the Preview Curriculum icon.

Major Requirements:*

**Major Requirements (B.S.) 49 units**

Please consult an advisor in your major department for clarification and interpretation of your major requirements. The major consists of 48 units; the B.S. degree requires a total of 120 units.

**Introductory Core (10 units)**

Basic lower division requirements.

- CS 100 Programming for Everyone
- MATH 130 Calculus I

Select one course from the following:
- MATH 131 Calculus II
- STAT 303 Statistical Methods in Biology
- STAT 310 Statistical Methods in the Social Sciences
- STAT 315 Exploring and Analyzing Data

**Advanced Core (24 units)**

The following 5 courses are required:

- STAT 320 Introduction to Probability Theory I
- STAT 330 Statistical Inference
- STAT 331 Introduction to Analysis of Variance
- STAT 432 Introduction to Linear Regression and Logistic Regression
- STAT 495 Data Analysis with SAS

Select 3 Elective Courses (9 units) from the following:

- STAT 351 Sampling Procedures for Surveys
- STAT 450 Introduction to R Programming for Data Science
- STAT 451 Introduction to Data Visualization
Area of Emphasis (15 units)

Complete one of the following:

Fifteen units of approved Statistics courses in addition to those used for the requirements above. **MATH 230 Calculus III** may be included in these 15 units and is especially recommended for students wishing to apply to the master's degree program in Statistics.

Fifteen units of approved Computer Science courses in addition to those used for the requirements above.

Fifteen units of approved Mathematics courses in addition to those used for the requirements above. **MATH 230 Calculus III** must be included in these 15 units.

Fifteen units of approved courses in an approved area. Areas currently approved include the following: Anthropology, Biological Sciences, Business Administration, Chemistry, Economics, Geography, Geological Sciences, Health Sciences, Physics, Psychology, Sociology. For other areas, contact the Department of Statistics and Biostatistics. To gain departmental approval, these courses must include at least one upper division course and be judged to constitute a coherent program of study. (With the approval of the department, upper division Statistics courses not counted above, except **STAT 310** and **STAT 303** may be applied toward these fifteen units.)
To revise an existing concentration (formerly option) or create a new concentration, select form 3a. Semester Conversion Request for Approval of New or Revised Undergraduate Concentration.

Total Units Required

| Quarter Based Program:* | 180 | Semester Based Program:* | 120 |

Total Units should not exceed **120 Semester Units** unless previously approved by Chancellor's Office for exemption.

**B.A. Programs:** Major requirements are a minimum of 24 units with at least 12 upper division units.

**B.S. Programs:** Major requirements are a minimum of 36 units with at least 18 upper division units.

See [Unit Calculator](https://csueastbay.curricolog.com/proposal:1912/print) for assistance.

If the program has a similar transfer model curriculum (TMC), please e-mail Kyle Burch, Articulation Officer, Academic Programs and Graduate Studies, to verify that the revised program meets the TMC requirements prior to submitting the program revision request form.

- Is the major approved as a "similar" degree under the STAR Act (SB 1440)?
  - [ ] Yes
  - [ ] No
  - [ ] I'm not sure (Articulation Office will contact you)

If yes, explain how this modification will affect the "similar" degree agreement.
Were any concentrations (options) discontinued? *

- Yes
- No

If yes, please explain below. If no, please enter "N/A" or "not applicable." *

n/a

Is this major approved as an online degree program? *

- Yes
- No

If no, is there any pathway in the revised degree that is more than 50% online?

- Yes
- No

Resource implications of the proposed revision, if any:

none

Relationship of Revised Program to requirements for teaching credentials, accreditation, and/or licensing, if any:

none
Consultation with other affected departments and programs:

The following department(s) has (have) been consulted and raised no objections:

Review occurs within College of Science Curriculum Committee.

The following department(s) has (have) been consulted and raised concerns:

none

Attachments

Please scroll to the top of this form and select the Files icon to attach the following documents to your proposal:

- Bachelor's Degree Roadmap
- Curriculum Map 1 - PLOs to Courses
- Curriculum Map 2 - PLOs to ILOs
- Five Year Assessment Plan

Did you attach your Curriculum Maps, Five Year Assessment Plan or other supporting documents to this proposal?

- Yes
- No

Catalog Item Types

Degree Type
| Program Type* | Bachelor |
# Steps for Statistics (B.S.) 120 units

## Originator

<table>
<thead>
<tr>
<th>Participants</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitch Watnik 3/14/2016 10:40 AM</td>
<td>Required for Approval: 100% required Date Completed: 3/14/2016 10:40 AM Changes: Yes Comments: No</td>
</tr>
</tbody>
</table>

## Department Chair

<table>
<thead>
<tr>
<th>Participants</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitch Watnik 3/15/2016 3:10 PM</td>
<td>Required for Approval: 100% required Date Completed: 3/15/2016 3:10 PM Changes: Yes Comments: No</td>
</tr>
</tbody>
</table>

## Dean's Office Review

<table>
<thead>
<tr>
<th>Participants</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jason Singley 3/15/2016 4:32 PM</td>
<td>Required for Approval: 100% required Date Completed: 3/15/2016 4:32 PM Changes: No Comments: No</td>
</tr>
</tbody>
</table>

## College Curriculum Committee Approval

<table>
<thead>
<tr>
<th>Status: Approved</th>
</tr>
</thead>
</table>

https://csueastbay.curriculog.com/proposal:1912/print
Participants

College of Science Curriculum Committee

- Science CCC - March 17, 2016
  - Anne Kotchevar * 5/9/2016 11:05 AM
  - Jason Singley * 5/17/2016 11:52 AM

Activity

Required for Approval:
- 50% required

Date Completed:
- 5/17/2016 11:52 AM

Changes: No
Comments: Yes
Agenda: Yes

* Agenda Administrator

Dean's Office Approval

Participants

- Jason Singley 5/17/2016 11:52 AM

Activity

Required for Approval:
- 50% required

Date Completed:
- 5/17/2016 11:52 AM

Changes: No
Comments: No

Articulation Officer Review

Participants

- Kyle Burch 5/17/2016 4:00 PM

Activity

Required for Approval:
- 100% required

Date Completed:
- 5/17/2016 4:00 PM

Changes: No
Comments: No

APGS (Technical Review)

Participants

- Sarah Aubert
- Sandra Claflin
- Stephanie Matsuda 6/14/2016 9:11 AM
- Stephanie Matsuda (System Administrator) 6/14/2016 9:12 AM

Activity

Required for Approval:
- 33% required

Date Completed:
- 6/14/2016 9:12 AM

Changes: Yes
Comments: Yes
### APGS (Dean, Undergraduate Studies Review)

**Status:** Approved

**Participants**
- ✔ Maureen Scharberg 7/8/2016 4:30 PM

**Activity**
- Required for Approval: 100% required
- Date Completed: 7/8/2016 4:30 PM
- Changes: No
- Comments: Yes

### Committee on Instruction and Curriculum

**Status:** Restarted

**Participants**
- ▲ CIC
  - Mitch Watnik *
- ▲ Additional Participants

**Activity**
- Required for Approval: 100% required
- Date Completed: 8/11/2016 10:05 AM
- Changes: No
- Comments: No
- Agenda: Yes
- * Agenda Administrator

### Committee on Instruction and Curriculum

**Status:** Restarted

**Participants**
- ▲ CIC
  - Eileen Barrett *
  - Sophie Rollins *
- ▲ Additional Participants

**Activity**
- Required for Approval: 100% required
- Date Completed: 10/17/2016 1:35 PM
- Changes: No
- Comments: No
- Agenda: Yes
- * Agenda Administrator

### Committee on Instruction and Curriculum

**Status:** Approved
<table>
<thead>
<tr>
<th>Participants</th>
<th>Activity</th>
</tr>
</thead>
</table>
| **CIC** | Required for Approval: 100% required  
Date Completed: 12/7/2016 1:17 PM  
Changes: No  
Comments: Yes  
Agenda: Yes  
* Agenda Administrator |
| - Sophie Rollins * 12/7/2016 1:17 PM  
- Mitch Watnik * 12/7/2016 12:50 PM |
| **Additional Participants** | |

<table>
<thead>
<tr>
<th>Custom Route</th>
<th>Status: Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>Activity</td>
</tr>
</tbody>
</table>
| **** | Required for Approval: 100% required  
Date Completed: 1/5/2017 11:03 AM  
Changes: Yes  
Comments: Yes  |
| - Mitch Watnik 1/5/2017 11:03 AM |

<table>
<thead>
<tr>
<th>Executive Committee</th>
<th>Status: Working</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>Activity</td>
</tr>
</tbody>
</table>
| **ExCom** | Required for Approval: 100% required  
Time Spent: 0 minutes  
Changes: No  
Comments: No  
Agenda: Yes  
* Agenda Administrator |
| - Mark Karplus *  
- Sophie Rollins * |

<table>
<thead>
<tr>
<th>Academic Senate</th>
<th>Status: Incomplete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>Step Details</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| **Academic Senate**  
Sophie Rollins * | Required for Approval:  
100% **required**  
Work: *comment*  
Agenda: Yes  
* Agenda Administrator |

<table>
<thead>
<tr>
<th>Participants</th>
<th>Step Details</th>
</tr>
</thead>
</table>
| Mary Barnum | Required for Approval:  
100% **required**  
Work: *comment* |

<table>
<thead>
<tr>
<th>Participants</th>
<th>Step Details</th>
</tr>
</thead>
</table>
| Sarah Aubert  
Sandra Claflin | Required for Approval:  
100% **required**  
Work: *edit, comment* |
Attachments for Statistics (B.S.) 120 units

bs-stat-degree-roadmap.xls (uploaded by Mitch Watnik, 3/14/2016 10:38 am)
curr-map-1_BS_Statistics.docx (uploaded by Sandi Jones, 3/16/2016 9:26 am)
curr-map-2_BS_Statistics.docx (uploaded by Sandi Jones, 3/16/2016 9:26 am)
SLO Statistics BS_semesters.docx (uploaded by Sandi Jones, 3/16/2016 9:27 am)
five-year-plan_BS_Statistics.docx (uploaded by Sandi Jones, 3/16/2016 9:29 am)
## Comments for Statistics (B.S.) 120 units

### Mitch Watnik
1/5/2017 11:03 am

Changes recommended by CIC have all been implemented. (Note there was a typo: "transfer" was written in place of "transformed").

### Mitch Watnik
12/6/2016 11:28 am

CIC approved this proposal unanimously on Nov. 14. This is documented as CIC 41.

There was a request to change the roadmap to make it 120 units by including electives, to strike the "honors" section, to change the core parts from "lower division" and "upper division" to "introductory core" and "advanced core", and to elaborate on the transfer explanation. All of this can be handled by the Department Chair, but I cannot do it at the CIC step.

### Maureen Scharberg
7/8/2016 4:30 pm

Road map should be at 120 units. Please add units for electives to bring degree up to 120.

### Stephanie Matsuda
6/14/2016 9:11 am

At final review and export, will edit Lower Division Core format as it currently includes UD courses in selection.

### Anne Kotchevar
5/9/2016 11:05 am

Unanimously approved by the College of Science curriculum committee

### Mitch Watnik
4/25/2016 9:17 am

Corrected course titles.

## Decision Summary for Statistics (B.S.) 120 units

### Executive Committee

**Status:** Working

**Step Summary**
This step requires 100% approval from all participants to move forward.
<table>
<thead>
<tr>
<th>Participants</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ ExCom</td>
<td>Users Approved: 0</td>
</tr>
<tr>
<td>Mark Karplus *</td>
<td>Users Rejected: 0</td>
</tr>
<tr>
<td>Sophie Rollins *</td>
<td></td>
</tr>
</tbody>
</table>

https://csueastbay.curriculog.com/proposal:1912/print