



ANNUAL PROGRAM REPORT

College	Science
Department	Statistics and Biostatistics
Program	BS Statistics
Reporting for Academic Year	2020-2021
Last 5-Year Review	2018-2019
Next 5-Year Review	2023-2024
Department Chair	Ayona Chatterjee
Author of Review	Ayona Chatterjee
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**I. SELF-STUDY**

**A. Five-Year Review Planning Goals**

The five-year review includes planning goals for curriculum (3.1), students (3.3), faculty (3.4), and resources (3.5).

To summarize, the curriculum plans (3.1) include:

1. Develop online courses at the undergraduate level
2. Continue to develop curriculum that addresses cloud computing and big data, beyond what we already have.

The student plans (3.3) include:

1. Enhance and grow our BS program
2. Recruit community college students into our BS program
3. Increase the use and diversity of computation in courses
4. Raise funds to increase our scholarship and leadership funds with a focus on alumni engagement.

Faculty plans (3.4) include:

1. Anticipation of our junior faculty receiving retention or promotion so that they can devote more time to program development and enhancement
2. Hire tenure-track faculty to replace recent attrition due to retirement
3. Hire faculty with expertise reflecting industry demands in Biostatistics
4. Increase our number of long-term lecturers

Resource plans (3.5) include:

1. Move away from calculators to more cloud based software for all courses.
2. Upgrade office furniture for tenured/tenure-track faculty
3. Lower the proportion of major courses taught by lecturers

4. Increasing our current 1.0 staff support to our former level of 1.75 staff support

## **B. Progress Toward Five-Year Review Planning Goals**

Regarding 3.1 (Curriculum):

1. Development was done to create online versions of all courses, in light of mandatory distance learning due to the pandemic. We now are in the process of editing these changes in Cirrculog so that there is flexibility in the course modalities for some of our electives going forward.
2. The Statistics BS program now has a Data Science Concentration (effective Fall, 2018), which is more reflective of current demands. Curriculum development for this concentration has resulted in faculty pursuit of cloud-based and modern computation methods to best serve our students.

Regarding 3.3 (Students):

1. From Fall 2019 to Fall 2020, our undergraduate program grew by 12%. We attribute this to the popularity of our new Data Science concentration. As of Fall 2021 we admitted 46 new students to our program which shows a growth of more than 100% for the program over the last 5 years.
2. With the creation of STAT 215 Introduction to Data Science, we have added Python to the programming languages used in our undergraduate program.
3. Python and Tableau were recently introduced to add to the existing software used, R and SAS, among others.
4. Fundraising did not increase this year.

Regarding 3.4 (Faculty):

1. Assistant Professor Wendy Rummerfiled was hired and started this Fall of 2021.
2. Assistant Professor Jiyoun Myung started in Fall 2020 and is successfully retained and entering her second year. Assistant Professors Li Zou and Eric Fox were both granted retention, now entering their fourth year. Professor Eudey begins her fourth year of FERP in Fall, 2020. Professor Watnik continues to work as Associate Dean, Academic Programs and Services.
3. The Department received approval to hire for one position during the 2021-2022 academic year. This search has a focus for finding faculty with expertise in Biostatistics. The position is open currently and review pf candidates will begin October 2021.
4. We currently have three lecturers on 3-year contracts and three lecturers on a 1-year contract.

Regarding 3.5 (Resources):

1. We have been able to support the use of RStudio Cloud for all our upper division data science classes in the undergraduate program.
2. Lectures teaching on ground have access to microphones to use during class.
3. Our new ASC, Jamane Joseph, is continuing in her position to support the department. Our staffing level has remained the same.

## **C. Program Changes and Needs**

**Overview:** Semester conversion and EO 1110 has had an incredible impact on our department. This has resulted in a significant increase in work for our staff, hiring TAs from our graduate student pool, and substantial revision of our curriculum at all levels to meet the needs of students. This has been exacerbated by the current pandemic, requiring us to teach online.

**Curriculum:** With the implementation of EO 1110, the department now hires graduate students as TAs to teach newly developed support courses, beginning Fall 2018. With semester conversion, the department now offers a concentration in Data Science at the undergraduate level.

We also now have a calculus optional pathway for students to achieve a BS in Data Science. We are working closely with nearby community colleges (Skyline and Chabot) to create transfer pathways for students to come to East Bay for the Data Science major.

**Students:** No significant changes. But we do notice a higher demand for online instruction for certain courses.

**Faculty:** We continue to have a need for faculty specially with a focus on modern Biostatistics methods.

**Staff:** With the implementation of EO 1110, an already strained staff has had a significant increase in workload. Additional support is needed.

**Resources:** Our Department's programs would greatly benefit from a dedicated computer lab and/or funds so that every graduate student has his/her own laptop computer or accounts on cloud sites that would enable running and utilizing statistical software and solutions.

**Assessment:** The department continues to carefully monitor the assessment of its programs, proposing curricular and advising changes, as necessary.

**Other:** No significant program modifications were made last year.

## **II. SUMMARY OF ASSESSMENT**

### **A. Program Learning Outcomes (PLO)**

<b>PROGRAM LEARNING OUTCOMES (PLOs)</b>	
Students graduating with a BS in Statistics will be able to:	
<b>PLO 1</b>	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.
<b>PLO 2</b>	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.
<b>PLO 3</b>	Communicate to others results involving descriptive statistics and data visualization, hypothesis testing, confidence intervals, modeling and error analysis using reproducible research best practices.
<b>PLO 4</b>	Generate data sets 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.

### Program Learning Outcome(S) Assessed

Year : 2020-2021	
1. Which PLO(s) to assess	PLO 1
1. Is it aligned to an ILO?	Yes
1. If yes, list ILO.	Thinking & Reasoning
1. Course name and number	STAT 432 – Introduction to Linear and Logistics Regression
1. SLO from course	Apply statistical methodologies, including (a) simple and multiple linear regression, (b) model diagnostics and transformations, and (c) logistic regression. Communicate statistical concepts clearly and appropriately to others.
1. Assessment activity	Data Analysis and Project
1. Assessment Instrument	Departmental Rubric
1. How data will be reported	Quantitative , report to include proportion of students in each level 1-5 (5 mastered)
1. Responsible person(s)	Instructor for STAT 432, Assessment Rep
1. Time (which semester(s))	Spring 2019
1. Ways of closing the loop	Internal assessment of assignment and rubric

### B. Summary of Assessment Process

#### Instrument(s):

For the Statistics BS program STAT 432 “Regression” was formally identified as the course to use for end-of-program assessment. Majors usually take this in their last semester.

**Sampling Procedure:** We sample by gathering data from all students attempting to complete our capstone experience. Specifically, the capstone experience for the BS Statistics is the regression course, STAT 432.

**Sample Characteristics:** All undergraduate majors completing STAT 432 were sampled.

**Data Collection:** STAT 432 is given every Spring for which the SLO’s identified are assessed by the instructor on record.

**Data Analysis:** The instructor creates a rubric 1-5 (5 mastered) for the project assigned.

<i>Course name and number</i>	STAT 432 – Introduction to Linear and Logistics Regression
<i>SLO from course</i>	Upon successful completion of this course, students will be able to communicate statistical concepts clearly and appropriately to others.
<i>Assessment activity</i>	Data Analysis and Project
<i>Assessment Instrument</i>	Departmental Rubric
<i>How data will be reported</i>	Quantitative, report to include proportion of students in each level 1-5 (5 mastered)
<i>Responsible person(s)</i>	Instructor for STAT 432, Assessment Rep

**Summary of Assessment Results**

Main Findings: **Main Findings:**

Percentages of Rubric-Scores for Statistics BS 2020-2021

Score	Percentage of students
1	10% (3 out of 30 students)
2	7% (2 out of 30 students)
3	17% (5 out of 30 students)
4	23% (7 out of 30 students)
5	43% (13 out of 30 students)

**Recommendations for Program Improvement:**

Due to semester conversion, much of existing course content and course sequences have been altered. This has resulted in a drastic increase of student advising.

**Next Step(s) for Closing the Loop:**

We will continue to monitor the evaluation of our SLO's to determine if additional advising or curricular changes need to be addressed.

**Other Reflections:** We have no additional reflections on assessment currently.

**C. Assessment Plans for Next Year**

Most PLOs are the same and assessment will be for comparable courses.

**Year : 2021-2022**

1. Which PLO(s) to assess

PLO 2

1.	<i>Is it aligned to an ILO?</i>	No
1.	<i>If yes, list ILO.</i>	
1.	<i>Course name and number</i>	STAT 432 – Introduction to Linear and Logistics Regression
1.	<i>SLO from course</i>	Apply statistical methodologies, including (a) simple and multiple linear regression, (b) model diagnostics and transformations, and (c) logistic regression.
1.	<i>Assessment activity</i>	Data Analysis and Project
1.	<i>Assessment Instrument</i>	Departmental Rubric
1.	<i>How data will be reported</i>	Quantitative , report to include proportion of students in each level 1-5 (5 mastered)
1.	<i>Responsible person(s)</i>	Instructor for STAT 432, Assessment Rep
1.	<i>Time (which semester(s))</i>	Spring 2019
1.	<i>Ways of closing the loop</i>	Internal assessment of assignment and rubric

### **III. DISCUSSION OF PROGRAM DATA & RESOURCE REQUESTS**

#### **A. Discussion of Trends & Reflections**

##### **Notable Trends;**

Please see Appendix A for graphs and tables supporting the following information.

Our BS Statistics program is on the rise. We have seen a 130% increase in undergraduate majors over the past 5 years, 18 in 2015 and 46 as of the writing of this report.

The Department of Statistics and Biostatistics continues to have one of the highest SFR in the College of Science. The department's FTEF % grew slightly for tenured / tenure track while decreasing slightly for non-tenure / tenure track.

We are also graduating students within an acceptable amount of time, two-years for transfers and less than four years for freshmen. Though we do have a small sample size for these results, the department is working hard to maintain this trend.

##### **Reflections on Trends and Program Statistics:**

The Department of Statistics and Biostatistics is a huge service department for the College and University with a high SFR. We have always had a large graduate program, but now that our undergraduate program is taking off, primarily due to the concentration in Data Science, our tenure track faculty are being spread even thinner throughout our three programs.

Also not reflected in this data is the huge impact of EO 1110 on our department. Our commitment to providing service courses for the university is larger than ever. There has been considerable investment by the faculty in development of the new support-course model to accommodate the new freshmen who are no longer able to take remedial mathematics and are going straight into a B4 course. This requires a whole new pedagogy for those courses that did not exist before. This means that a different population with a deeper level of needs is populating these service courses.

Going forward we do want to focus on improving enrollment of women in our majors. This Fall we are creating a Action Team to focus on DEI activities within the department. The team includes faculty, staff and students. One of the primary goals is to increase women representation in our undergraduate program and understand the achievement gaps among our majors.

**B. Request for Resources**

1. Request for Tenure-Track Hires: provide evidence from trends provided.  
Increase our tenure-track faculty to sustain offering for our graduate courses in Biostatistics. We foresee growing our Biostatistics program and also the fact that's some of our Biostatistics faculty may retire in the near future and would like to be prepared for. Prof Eudey is in her 4<sup>th</sup> year of her FERP and it will be prudent for the department to plan ahead.
  
2. Request for Other Resources  
Currently, we are leveraging EO 1110 efforts to support many curricular innovations and support structures such as Teaching Assistants, Supplemental Instruction, and Learning Assistants. We hope to continue getting assigned time for coordination of the B4 curriculum.  
As the undergraduate program grows, we would also like to explore having assigned time for an undergraduate advisor.

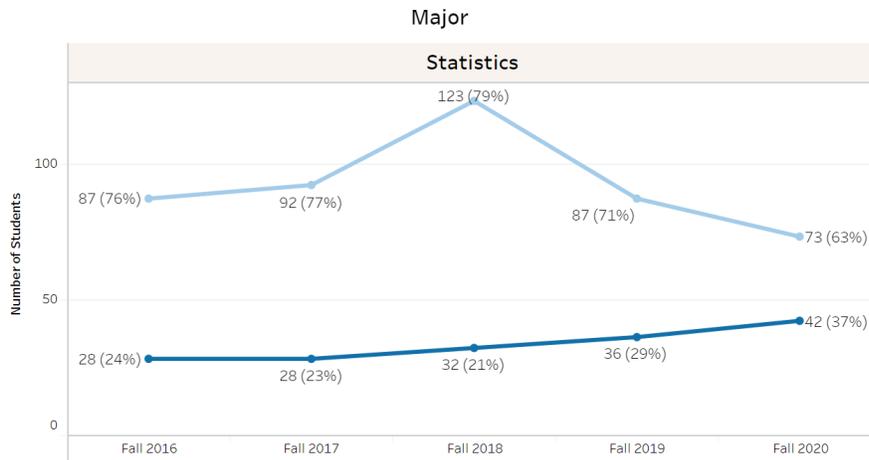
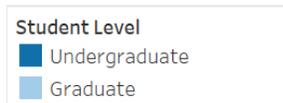
## Appendix A

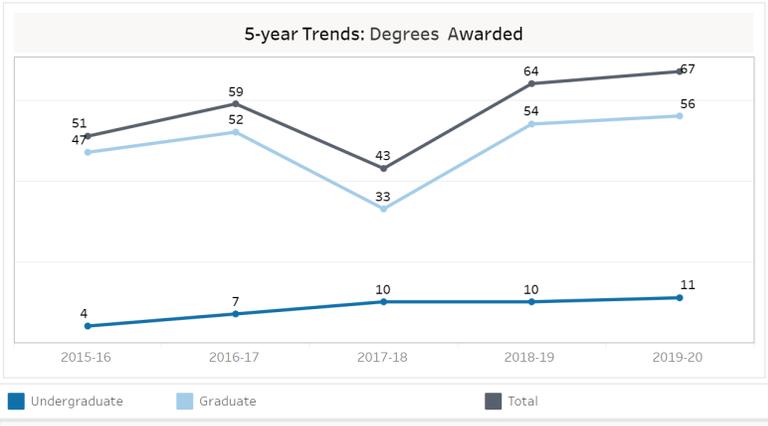
### III A. Discussion of Trends & Reflections

#### Notable Trends:

Tables of enrollment for Fall 2020 are broken down by race/ethnicity and sex.

Fall 2020	Statistics BS (%)
Asian	12 (29%)
Black/African American	4 (10%)
International	5 (12%)
Latinx	11 (26%)
Multiple Races	2 (5%)
Unknown	2 (5%)
White	6 (14%)
Fall 2020	Statistics BS (%)
Female	13 (31%)
Male	29 (69%)





### Time to Degree (Yrs) (and Headcount)

	First-time Freshmen	Transfer
<b>Grand Total</b>	3.7 (2)	2.0 (9)
CSCI Statistics	3.7 (2)	2.0 (9)

Make a selection in the table above to filter charts further

