California State University, East Bay

5-Year Program Review for
Statistics, B.S.
Statistics, M.S.
Biostatistics, M.S.
Department of Statistics and Biostatistics

2018-2019
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1. Summary

The Department of Statistics and Biostatistics offers one Bachelor’s degree, two Master’s degrees, and two minors. The B.S. program has a new option in Data Science. The M.S. program in Statistics has four options: Data Science (new), Applied Statistics, Mathematical Statistics, and Actuarial Science. For the official review, there are three programs included in this document:

- Statistics, B.S.
- Statistics, M.S.
- Biostatistics, M.S.

The Department of Statistics and Biostatistics continues to serve a heavy graduate population with a growing undergraduate program. In addition, many service courses continue to be offered through the department, particularly in the GE Area B4 requirement as well as more advanced statistics courses that are required by outside programs.

The department has addressed the issues brought up at the last review, with mixed results. Notably, (1) the number of tenure-track faculty has remained constant despite the recommendation for growth, (2) the programs have been adjusted to offer courses that are relevant in today’s job market (“modernizing”), and (3) the staff support remains below the recommendation with only one full time admin.

The curriculum has been vastly overhauled. With the conversion to semesters, the department was able to take the opportunity to adjust the progression for students within each of the programs, while adding Data Science concentrations to both the Statistics, B.S. and Statistics, M.S. programs.

Going forward, the department does not anticipate any major changes to the newly-developed curriculum over the next five years but realizes that it may have to make smaller curricular changes to best meet the needs of its students during this period. The department hopes to add additional tenure-track faculty resulting in a stronger presence in the undergraduate program.

The external reviewer concluded that we offer a strong and unique M.S. degree program. Furthermore, there is room for growth with a positive outlook on the undergraduate program. The reviewer noted some areas of expertise to look for with new hires.
2. Self-Study

2.1 Summary of Previous Review and Plan

Our last program review was undertaken in 2010-2011, the outside reviewer was Dr. Mary Ellen Bock. Dr. Bock was the Chair of the Department of Statistics at Purdue University and a former President of the American Statistical Association in 2007. Dr. Bock was our outside reviewer for our last 3 reviews. She has brought her vision to our Department and helped to guide our growth and development for the last 2 decades.

The primary issues raised in our last 5-year review were the lack of growth in the tenure track faculty, relative to student growth. No new faculty were hired between the previous two five year reviews. In the previous review 2010-2011 the recommendation was to hire 5 new tenure-track faculty members. Since that last review, 3 new faculty have been hired: Dr. Chatterjee, Dr. Fox, and Dr. Li. During that time, one faculty member retired fully from FERP, Dr. Norton, while another has retired to the FERP program, Dr. Eudey, and a third has moved on to administration, Dr. Watnik. The number of Department faculty has remained constant since the last review.

In the previous review, the areas of Analytics, Massive Data, Machine Learning, and other computationally oriented areas was mentioned as areas that could not be served without new faculty. The university has invested in the Business College to offer a Business Analytics program that has not included the Department of Statistics and Biostatistics into its long term plans, has hired a number of higher paid faculty to teach the same course topics as the faculty in Statistics, and the Department of Statistics and Biostatistics has continued to offer courses and has developed more courses in these areas. The specific graduate courses are STAT 660 Advanced SAS, STAT 650 R for Data Science, STAT 651 Data Visualization (formally STAT 6610), STAT 652 Statistical Learning with R (formally STAT 6620), STAT 653 Statistical Natural Language Processing, and STAT 654 Applied Deep Learning. At the undergraduate level, these courses are STAT 450 Introduction to R for Data Science, STAT 451 Introduction to Data Visualization, and STAT 452 Introduction to Statistical Learning.

The lack of release time for the Chair to effectively run the department was identified, further release time was removed after the previous 5-year review. While some release time was returned with the conversion to semesters, the work load for the Chair with the introduction of further service courses and the overseeing of graduate student teaching assistants, providing coordination and support, has exceeded the previous amount of release time granted to the Department Chair.

In the previous review the low number of service courses was identified and the lack of faculty to teach further service courses was mentioned. Since the last review the Department has been offering more service courses and now, since the conversion to semesters, the number of service courses is expected to rise.

One of the most important changes to the course offerings in the Department since the last review was the creation of separate first year courses for the MS program. Formerly, these first year courses were tiered courses with their undergraduate counterparts. As the number of graduate students have increased separating these courses has helped both the graduate students and helped the undergraduate students. While the second offerings were still being offered as split-level courses, the primary offering were separate. These courses were STAT 3401 Probability I, STAT 3402 Probability II, STAT 3502 Inference, STAT 3503 ANOVA, STAT 4601 Regression and the graduate equivalents that were created, STAT 6304, 6305, 6509, 6204, 6205. All of these courses have been converted to
semester courses. In addition to the courses being separated, under semesters, split-level courses will not be allowed.

Prior to the last review, the Department of Statistics and Biostatistics had 1.75 staff support while at the time of the previous review, the staff support was at 1.5, with the main staff member and a 5. student assistant. Since then, the Department staffing has been reduced to 1.0 and currently the staff member has retired. Hiring a new staff member is a priority in the Department. As a result of the loss in staffing, none of the requirements and obligations of the Professional Science Masters (PSM) designation have been attended to. With the lack of staff support this effort has ended.

As a result of the Chancellor’s Office required changes outlined in the Executive Order 1110, the Statistics and Biostatistics Department has developed and started to offer courses that coordinate with 1-unit support courses to meet the quantitative reasoning requirements of the CSU for students taking Statistics courses. This effort was not new to the Department because of its participation in the Statway efforts in the College of Science, approximately 5 years ago.

Since the last review the Department participated in offering Statistical Consulting to the University through the Office of Faculty Development. This effort lasted approximately three years and then ended. The Department of Statistics and Biostatistics is no longer connected to the Office of Faculty Development and no consulting has been taking place since the end of the program.

Overall enrollments in the graduate MS Statistics program has reached capacity. The MS Biostatistics program has not grown. The undergraduate BS Statistics program has shown a slow growth. With the addition of the Data Science Option in the MS Statistics program and the Data Science Concentration in the BS Statistics program, enrollment growth is expected.

The previous review encouraged the Department to pursue Data Analytics, Machine Learning, and Data Mining of massive data sets. While the Department tried to participate in each of these, the University investments have been in other Colleges and Departments. The Business College created a Business Analytics program and used our courses as electives and then did not continue these courses as electives under semesters. Machine Learning was taken by the Department of Computer Science and now the Department of Statistics offers courses in Statistical Learning. As for massive data, we still do not have access to any Cloud computing technology through University IT, this is while repeated requests for help in this area have gone unmet.

The Department has continued to support and have students admitted to PhD programs.

2.2 Assessment and Curriculum

**MS Statistics and MS Biostatistics degrees**: Since the last review there has been major changes to the curriculum. The main change for our master’s program has been the introduction of the Data Science classes. We introduced two classes, Data Visualization and Statistical Learning. These classes have had an overwhelming positive response from students both within our major and from all over campus. This resulted in the department having to offer 3 sections of a course at certain times. We also updated the regression course, STAT 6509, to include an introduction to Logistic Regression. Students are consistently exposed to multiple statistical software such as R, SAS, Tableau, and Python. CSUEB has just moved from a quarter to a semester system starting Fall 2018. This provided us with the opportunity to update our courses, modify our program, and add more relevant topics to our major. We
still offer both MS in Statistics and Biostatistics. We have eliminated the “Computation Statistics” concentration and replaced it with the “Data Science” concentration to our program. Under the semester system certain courses have been combined to create a structure that students can take 8 units per semester and graduate with their degree in two years. We have added 2-unit electives that run for half a semester on various topics with the primary intention of exposing students to more ideas in statistics and preparing them for the job market. The regression course, STAT 632, in the semester system now includes both Linear and Logistic Regression which is a slight change from the quarter system which did not allow much discussion on Logistic Regression. We also have a new course in Bootstrapping, STAT 641, that will be offered to students in the Spring semester. This allows students to have covered all the materials they would see in the two quarters if their mathematical statistics class which is now condensed in one semester. Our steady enrollment of graduate students has ensured that we are able to offer two sections for each of our required classes. We are now offering five Data Science courses under semesters with the new addition of an advanced R course, a course in natural language processing, and in deep learning.

In the time period between 2013 – 2017 we have had on, an average, 111 full time students enrolled in the graduate programs for both statistics and biostatistics in the Department of Statistics and Biostatistics. We are the second largest graduate program in the College of Science, behind Computer Science. Based on the latest data from the CSU dashboard, the table below gives the full time and part-time enrollment in our department for the last five years.

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>5-YEAR AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STATISTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full time</td>
<td>72</td>
<td>94</td>
<td>92</td>
<td>79</td>
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<td>84</td>
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<td>Part time</td>
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<td>13</td>
<td>15</td>
<td>8</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>87</td>
<td>107</td>
<td>107</td>
<td>87</td>
<td>92</td>
<td>96</td>
</tr>
<tr>
<td><strong>BIOSTATISTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full time</td>
<td>34</td>
<td>34</td>
<td>24</td>
<td>22</td>
<td>21</td>
<td>27</td>
</tr>
<tr>
<td>Part time</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>37</td>
<td>36</td>
<td>24</td>
<td>23</td>
<td>22</td>
<td>28.4</td>
</tr>
<tr>
<td><strong>BOTH MAJORS TOTAL</strong></td>
<td>124</td>
<td>143</td>
<td>131</td>
<td>110</td>
<td>114</td>
<td>124.4</td>
</tr>
</tbody>
</table>

Nowhere else in the entire CSU system is a Master’s degree program in Statistics or Biostatistics offered by a Department of Statistics. Statistics Master’s programs offered through Mathematics departments are different from our programs. By updating our program and offering high-quality courses that prepare our students for the demands of the job-market as well as higher education, we are
able to successfully compete with MS programs in Statistics and Biostatistics throughout the United States.

I. Statistics, M.S.

a) Program Learning Outcomes

1. Apply statistical methodologies, including
   a. descriptive statistics and graphical displays,
   b. probability models for uncertainty, stochastic processes, and distribution theory,
   c. hypothesis testing and confidence intervals,
   d. ANOVA and regression models (including linear, and multiple linear) and analysis of residuals from models and trends.

2. Derive and understand basic theory underlying these methodologies

3. Formulate and model practical problems for solutions using these methodologies

4. Produce relevant computer output using standard statistical software and interpret the results appropriately

5. Communicate statistical concepts and analytical results clearly and appropriately to others; and

6. Understand theory, concepts, and terminology at a level that supports lifelong learning of related methodologies.

b) Curriculum map demonstrating the alignment of courses to PLOs for MS Statistics

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course</th>
<th>PLO 1</th>
<th>PLO 2</th>
<th>PLO 3</th>
<th>PLO 4</th>
<th>PLO 5</th>
<th>PLO 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT</td>
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<td>I-P</td>
<td>I-P</td>
<td>I-P</td>
<td>I-P</td>
<td>I-P</td>
<td>I-P</td>
</tr>
<tr>
<td>STAT</td>
<td>6304</td>
<td>I-P</td>
<td>I-P</td>
<td>I-P</td>
<td>I-P</td>
<td>I-P</td>
<td>I-P</td>
</tr>
<tr>
<td>STAT</td>
<td>6205</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>STAT</td>
<td>6305</td>
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<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>STAT</td>
<td>6509</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>STAT</td>
<td>6501</td>
<td>P-M</td>
<td>P-M</td>
<td>P-M</td>
<td>P-M</td>
<td>P-M</td>
<td>P-M</td>
</tr>
<tr>
<td>STAT</td>
<td>6502</td>
<td>P-M</td>
<td>P-M</td>
<td>P-M</td>
<td>P-M</td>
<td>P-M</td>
<td>P-M</td>
</tr>
<tr>
<td>Comprehensive Exam</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>ASSESSED</td>
</tr>
</tbody>
</table>

*Levels: I = Introduction, P = Practiced, M = Mastered (terms adopted from WASC)
c) We continue to use the MS Comprehensive exam as the capstone experience for our students. The exam has a closed book and an open book component head over two days of testing. We meet collectively to review and discuss all problems submitted for the MS Exam. Most times the questions for the exams are generated by faculty who have recently taught the respective courses. The exam is offered twice a year. Students are required to pass the MS comprehensive exam in order to graduate with their degree. For most years the fall cohort taking the exam is much smaller than the spring one.

For the MS Statistics MS PLO #5, STAT 6509 “Theory and Application of Regression” was used for assessment. It should be noted that the assessment of MS SLO #5 is at the end of the first year of the program, while the other assessments are at the end of the program.

d) Below we present the overall analysis of the scores on our MS Exams for the last five years. The terms include time starting from Fall 2013 to spring 2018. Unfortunately, due to a technical glitch the data for Fall 2016 is not available and hence not reported. Below is a histogram of total scores of individual students who took the MS Exam from Fall of 2013 to Spring of 2018. The grades are negatively skewed which implies few students have lower grades. A total of 246 MS Exams were graded, with an overall average score of about 64.3.

<table>
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<tr>
<th>MS STAT</th>
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<th>STD DEV</th>
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<tbody>
<tr>
<td>Spring 2018</td>
<td>30</td>
<td>61.15</td>
<td>15.31</td>
<td>66.50</td>
</tr>
<tr>
<td>Fall 2017</td>
<td>10</td>
<td>53.20</td>
<td>13.01</td>
<td>57.50</td>
</tr>
<tr>
<td>Spring 2017</td>
<td>53</td>
<td>71.92</td>
<td>17.87</td>
<td>77.00</td>
</tr>
<tr>
<td>Spring 2016</td>
<td>47</td>
<td>69.10</td>
<td>14.76</td>
<td>73.00</td>
</tr>
<tr>
<td>Fall 2015</td>
<td>15</td>
<td>53.00</td>
<td>18.28</td>
<td>48.00</td>
</tr>
<tr>
<td>Spring 2015</td>
<td>41</td>
<td>57.79</td>
<td>17.43</td>
<td>60.50</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>8</td>
<td>48.13</td>
<td>13.69</td>
<td>47.75</td>
</tr>
<tr>
<td>Spring 2014</td>
<td>37</td>
<td>67.96</td>
<td>15.03</td>
<td>70.00</td>
</tr>
<tr>
<td>Fall 2013</td>
<td>5</td>
<td>38.90</td>
<td>17.54</td>
<td>32.25</td>
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<tr>
<td>Degree</td>
<td>Sample Size</td>
<td>Mean</td>
<td>Std Dev</td>
<td>Median</td>
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<td>--------</td>
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<tr>
<td>STAT</td>
<td>246</td>
<td>64.30</td>
<td>17.77</td>
<td>65.88</td>
</tr>
</tbody>
</table>

e) A formal rubric for assessing students in STAT 6509 has been developed and from Spring 2019 we will be keeping a record of the outcomes of the learning outcomes.

II. Biostatistics, M.S.

a) Program Learning Outcomes
   1. Apply biostatistical methods to data, including
      i. descriptive statistics, probability and graphical displays,
      ii. distributions, hypothesis testing and confidence intervals, and
      iii. uncertainty, likelihood, modeling and error analysis;
   2. Derive basic theory and communicate to others results involving biostatistical data analysis;
   3. Formulate problem solutions, produce appropriate computer code and to interpret results.

b) Curriculum map demonstrating the alignment of courses to PLOs for MS Biostatistics

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Course</th>
<th>PLO 1</th>
<th>PLO2</th>
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<td>STAT</td>
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<td>I</td>
<td>I</td>
</tr>
<tr>
<td>STAT</td>
<td>6205</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>STAT</td>
<td>6304</td>
<td>I</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>STAT</td>
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<td>P</td>
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</tr>
<tr>
<td>STAT</td>
<td>6501</td>
<td>M</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>STAT</td>
<td>6502</td>
<td>M</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>STAT</td>
<td>6509</td>
<td>P</td>
<td>P</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>Comprehensive Exam</td>
<td>M</td>
<td>M</td>
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</tr>
<tr>
<td>BSTA</td>
<td>6651</td>
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<td>P</td>
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</tbody>
</table>
c) We continue to use the MS Comprehensive exam as the capstone experience for our students. The exam has a closed book and an open book component head over two days of testing. We meet collectively to review and discuss all problems submitted for the MS Exam. Most times the questions for the exams are generated by faculty who have recently taught the respective courses. The exam is offered twice a year. Students are required to pass the MS comprehensive exam in order to graduate with their degree. For most years the fall cohort taking the exam is much smaller than the spring one.

For Biostatistics MS PLO #2, BSTA 6653 “Clinical Trials in the Pharmaceutical and Biomedical Industries” is used for assessment.

d) Below we present the overall analysis of the scores on our MS Exams for the last five years. The terms include time starting from Fall 2013 to spring 2018. Unfortunately, due to a technical glitch the data for Fall 2016 is not available and hence not reported. Below is a histogram of total scores of individual students who took the MS Exam from Fall of 2013 to Spring of 2018. The grades are negatively skewed which implies few students have lower grades. A total of 58 MS Exams were graded, with an overall average score of about 71.4.

<table>
<thead>
<tr>
<th>MS BSTA</th>
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<td>Spring 2018</td>
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<td>89.05</td>
<td>4.56</td>
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<td>Fall 2017</td>
<td>1</td>
<td>77.50</td>
<td></td>
<td>77.50</td>
</tr>
<tr>
<td>Spring 2017</td>
<td>5</td>
<td>83.22</td>
<td>5.78</td>
<td>83.13</td>
</tr>
<tr>
<td>Spring 2016</td>
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<td>71.92</td>
<td>10.72</td>
<td>71.38</td>
</tr>
<tr>
<td>Fall 2015</td>
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<td>Spring 2015</td>
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<td>Fall 2014</td>
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<td>Degree</td>
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<td>Std Dev</td>
<td>Median</td>
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<tr>
<td>--------</td>
<td>-------------</td>
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<tr>
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<td>58</td>
<td>71.42</td>
<td>15.08</td>
<td>73.63</td>
</tr>
</tbody>
</table>

e) A formal rubric for assessing students in STAT 6653 has been developed and from spring 2019 we will be keeping a record of the outcomes of the learning outcomes.

III. Statistics, B.S. and minor

Over the years the number of BS majors in Statistics has been steady at around 10. We now have 26 undergraduate majors, including those who are double-majoring in Statistics with another major (e.g., Biology/Statistics). According to the numbers from the CSU Dashboard, we had 6 students graduate with a BS in Statistics in 2016. As for Fall 2018 there were 19 students who listed Statistics as a minor. We are focused on growing our undergraduate program. We have seen a growing number of students opting to minor in statistics.

a) Program Learning Outcomes

1. Apply basic computational skill in descriptive statistics and graphical displays; hypothesis testing and confidence intervals; modeling and error analysis
2. Communicate to others results involving descriptive statistics and graphical displays; hypothesis testing and confidence intervals; modeling and error analysis
3. Analyze data using appropriate statistical computer software and to interpret the results covering descriptive statistics and graphical displays; hypothesis testing and confidence intervals; modeling and error analysis.

b) Curriculum map demonstrating the alignment of course to PLO’s.
c) The faculty identified STAT 4601 “Regression” as the course to use for end of program assessment. The Statistics BS program has quite a bit of flexibility in the courses that are taken to complete the degree. STAT 4601 is a senior-level course, taken by all students, that has a written component to the coursework.

d) Gathering data for this assessment has proven difficult, particularly due to this course being commonly taught by lecturers.

e) The faculty have yet to devise a strategy to get this data that can then be used to possibly improve the program.

**General Education summary:** At the undergraduate level, the Department of Statistics and Biostatistics served the University by providing courses to the areas of B4 Quantitative Reasoning (STAT 1000, *Elements of Probability and Statistics*; STAT 2000, *Elements of Statistics for Business and Economics*), D4 Upper Division Social Science (STAT 3510, *Sampling Procedures for Surveys*; STAT 4000 *Analysis of Variance Psychology*), and B6 Upper Division Science (STAT 3050, *Statistics: from Data to Decisions*).

The B4 courses were required by most of the programs in the College of Science, and many programs in the College of Letters, Arts, and Social Sciences. The STAT 3031 *Statistical Methods in Biology* continues to be required by the Biology department and we have been offering two sections of this course on an average per quarter.

We also have continued to support the Psychology department with our course offerings in STAT 3010 and STAT 4000. We have been offering multiple sections of STAT 3010: Statistical Methods in Social Sciences, as this is a required class for all psychology majors and can be a bottleneck for the
psychology department majors. Up until this year we have also been providing service to the Engineering and CS and Math Departments, with STAT 3601 for Engineering and CS. Also STAT 3502 and 3401 have been electives in the Math major.

### 2.3 Student Success

#### Retention Rates & Graduation Rates

From the CSU East Bay dashboard, the following data are available for years 2013 to 2016 for our undergraduate majors. For both our undergraduate and graduate majors our retention rates in the first year are above 80%. For our B.S. degree, the four-year graduation rate is only available for the Fall 2013 cohort. From the chart below we can see for undergraduates this rate is much higher than the average campus rate of about 46%.

![Retention and Graduation Summary](chart.png)

For our graduate programs, both MS Statistics and MS Biostatistics we have a two-year rate from about 40%-60%. There are data missing for years 2015 onwards.
Achievement Gaps and Course Bottlenecks
None of the Statistics Department’s courses are considered as bottleneck courses or among the top courses with DFW rates.

The “Pioneer Insights” webpage provides an overview of the course outcome and demographics for each course in the university. Below we have a list of statistics courses from Spring 2018 with the highest DFW rate course on the top. We can see that STAT 3401 had a non-passing rate of 26%, of these non-passing students 23% were under-represented minorities (URM) and 56% were first-generation.

The percentage changes from quarter to quarter. For example, if we change from Spring 2018 to Winter 2018 then the non-passing rate for STAT 3401 goes down to 14%.

More information on courses can be found at https://data.csueastbay.edu/#/apr/program_data/course_outcomes
High impact practices

The faculty have been actively involved in including high impact practices in their classes. Many classes encourage group work and active learning. Several undergraduate and graduate courses require students to present in class and also work on written reports.

The department has a large emphasis on practical, real-life, experiences for all our undergraduate and graduate students. To facilitate this, most of our classes have time assigned in computer labs. In these labs students are exposed to various relevant statistical software and data sets. Even many of our introductory statistics classes have access to computer labs. This provides our students with hands-on experience in data wrangling, data analysis and report writing. The Statistics Department does not have its own lab and we are sometimes dependent on the college for our classes to be assigned to labs.

The campus provides training for faculty to include such practices in their teaching. Dr. Ayona Chatterjee is currently in the Transforming STEM Teaching 2018 Faculty Learning Program, a one-year workshop that dives into the research behind active learning techniques, finding resources that support use of such techniques in various discipline, reflecting on changes in our pedagogy, and supporting others in doing so.

Dr. Chatterjee was also the Faculty in Residence for a Faculty Learning Community (FLC) in “Student Success”. The FLC focused on identifying barriers to student success across campus and looked at ways in which data-driven decisions can be taken to improve student success.

Advising

Student advising has continued to be an important area of interest of the faculty and helping students to plan clearly to complete our BS and minor degrees. Although all faculty are considered
“Undergraduate Advisors”, one member of the faculty is usually the point person for undergraduates to go to in order to get consistent advising. This person can change annually to give all faculty a chance to get to know our students.

At the graduate level, we have one primary graduate advisor for each of our programs, MS Statistics and MS Biostatistics. These advisors are heavily involved with our students even before they officially become our students, making sure they supply all documentation in their applications and answering any questions. Once in our program, these advisors guide our students in the optimal pathways towards graduation.

Course Redesign

Calculus is not required in the BS Statistics program if the student declares the Concentration in Data Science. We have created a new way to pursue studying Statistics with the use of computers and data rather than only using mathematics for the presentation of Statistics. This is in line with national trends in the field of Statistics.

2.4 External comparisons

There are no other Master’s Degree Programs in Statistics or Biostatistics offered in the CSU system by a Department of Statistics. Statistics Master’s Programs offered through the Mathematics department are different from our program. By updating our program and offering high-quality courses that prepare our students for the demands of the job-market as well as higher education, we are able to successfully compete with MS programs in Statistics and Biostatistics throughout the United States.

2.5 Students and Faculty

a) Student demographics of majors, minors, and options
See Appendix A, CSUEB APR Summary Data 2010-2018.

b) Student level of majors, minors, and options
See Appendix A, CSUEB APR Summary Data 2010-2018.

c) Faculty and academic allocation
Prof. Joshua Kerr, Associate Professor, Department Chair
Prof. Ayona Chatterjee, Associate Professor
Prof. Kelly Fan, Professor
Prof. Eric Fox, Assistant Professor
Prof. Eric Suess, Professor
Prof. YanYan Zhou, Professor
Prof. Li Zou, Assistant Professor
Prof. Lynn Eudey, Professor Emerita
Prof. Bruce Trumbo, Professor Emeritus

We have the following ten lecturers.
Dr. John Angell, Lecturer
Dr. Staffan Fredricsson, Lecturer
Chris Danko, Lecturer
d) Course data

This information is included above under “2. Self-Study/2.2 Curriculum and Student Learning.”

a. Enrollments in our undergraduate and graduate programs have remained stable in the past 9 years. The recent enrollment in 2018 has record 177 students in total. Undergraduate enrollment has been steadily increasing.

Student-faculty ratios have maintained at a relatively high level in the past 9 years. The number is more significant considering the student-faculty ratio in graduate level of 44.9 in comparison with the student-faculty ratio in all level of 37.3. More detailed information can be found in Appendix A, CSUEB APR Summary Data 2010-2018.
Having very high enrollments in the graduate classes (academic capacity 25) in the graduate programs and very high enrollments in the undergraduate service courses has resulted in a very high student-to-faculty ratio and has left very little room for the undergraduate programs to grow. However, since 2011 our undergraduate Statistics BS program has more than tripled while we have maintained very high SFR. The Department currently has basically the same number of faculty as 30 years ago when the graduate program had approximately 25 to 30 students. The faculty has been doing their best with many students.

The undergraduate program has very little time devoted to it and many of the courses have been taught by lecturers. While it is possible to hire lecturers to teach undergraduate classes, it is basically impossible to hire lecturers for the graduate classes, mainly as a result of the salaries that lecturers are paid.

b. There is no large structural difference between the diversity of the tenure track faculty and faculty lecturers in the department and those at the campus level.

c. No data

d. No data.

e. No data. We need data related the number of tenure track faculty teaching in lower/upper division courses in the past years. Similarly, we need data related the number of lectures teaching in lower/upper division courses in the past years.

f. No data.

g. No data.
Historically, the Statistics Department offers one or two sections of introductory statistics courses in Concord to support CSU East Bay’s Nursing program. This is almost always taught by a lecturer. No changes are anticipated.

The department has been offering the course *Advanced SAS* online for the last two years. This has allowed students who are interested in learning more about SAS to have the opportunity to do so.

Enrollment since the last 5-year review has been up and down, but currently we are on a high. There are 123 students enrolled in our MS program in Statistics and 22 students enrolled in our MS program in Biostatistics. We don’t have a record of application data beyond the current year.

All pertinent data elements have been discussed above.

### 2.6 Faculty

A copy of all applications submitted for new tenure-track positions since the last 5-year review are attached in Appendix B, Tenure-track Position Applications.

Since the last review, the primary faculty changes to our Department are related to academic allocation of faculty. Dr. Mitchell Watnik moved to the position of Associate Dean at CSUEB but is no longer teaching at our Department. Dr. Lynn Eudey was honored with a Professor Emerita and continues teaching part time at CSUEB.

Since the last review, another primary faculty change within our Department is related to new faculty hires. Two new faculty members, Dr. Eric Fox, PhD in Statistics from University of California at Los Angeles and Dr. Li Zou, PhD in Biostatistics from The State University of New York at Buffalo, joined our department at Fall 2018.

Since the last review, a number of our faculty have attended the annual Joint Statistical Meetings (JSM), one of the largest statistical events in the world, sponsored by the American Statistical Association (ASA) and the Institute of Mathematical Statistics (IMS). Several faculty members have made poster presentations.

All of our faculty members have been active professionally, through writing journal articles and/or textbooks. Many faculty members have provided statistical consulting services to CSUEB faculty. Dr. Julia Norton (Emeritus, FERPer) received the 2010 Carver Medal of the Institute of Mathematical Statistics (IMS). This prestigious medal is given for exceptional service to the IMS and is one of the highest honors in the field of Statistics. Dr. Norton has been nominated for the CSUEB 2011 Outstanding Professor Award. Dr. Bruce Trumbo (Emeritus, FERPer) received the 2009-10 Sue Schaefer Award for outstanding service to the University.
2.7 Resources

The Department of Statistics and Biostatistics relies on the Information Technology Services (ITS) unit for our ability to deliver our courses at all levels related to computer software. The most important software packages provided by the University are Minitab, SPSS, SAS, Tableau, Microsoft Office, Word, and Excel. All of this software is used in offering classes and the administration of our MS Exams.

The Department has always used computer labs for classes at all levels. The new, larger computer lab in the College of Science allows more of our instructors to have more opportunities to take students to the lab to get hands-on experience with statistical software and data.

The University’s Bay Cloud is a relatively new service provided to students and instructors that allows access to most software, that the University has a license for, from virtually any device with an internet connection. The most important use of this virtual computer lab has been related to our course STAT 3010, Statistical Methods in the Social Sciences. This year the licenses for SPSS changed, resulting in restricted use (campus-wide) of SPSS. This change ended our ability to provide this software to students for installation on their personal computers. However, Bay Cloud has continued to make SPSS available to students.

Our Department has been a long-time user of the College of Science’s web server to deliver supporting class materials and for posting useful materials related to faculty research and interests. These Google-indexable documents have long been one of the primary ways in which our Department recruits students. Allowing prospective, current, and former students to find and use our SAS and R code through the web has been one of the main avenues of communication we have with our students and the business world. This service has been invaluable to the growth of our Department.

The members of our faculty have also continued to increase their use of the course management system Blackboard for their classes. The gradebook has also become more commonly used. This increase in usage may result from the new University MyCSUEB system that was implemented a few years ago to record class grades electronically. The Statistics Majors group in Blackboard has been used by the Department for many years to direct communication with our current students. Emails are sent through Blackboard for class announcements and job announcements.

Our faculty have made use of the University Google email and drive system for communication with faculty, students, administrators, alumni, and others. Our faculty have also used Google documents for the preparation of our MS Exams, and some faculty have used the Google calendar, which is used by the University administration, to more easily access the dates of certain campus deadlines.

The Department provides resources to students through awarding annual scholarships. Prior to our last review, the Department had established four scholarships into perpetuity. Former office staff member Ann Cambra was assigned primary responsibility for raising scholarship funds. Over a period of several years, previous to 2012 she raised over $82,000, establishing the following scholarships:

- HEEBOK PARK SCHOLARSHIP, established in 1998
- GEORGE J. RESNIKOFF MEMORIAL SCHOLARSHIP, established in 1999
- STATISTICS DEPARTMENT SCHOLARSHIP, established in 1999
- JUSTIN RANDLE MEMORIAL SCHOLARSHIP, established in 2000.

Since our last review, Dr. Bruce Trumbo (Emeritus, FERPer) made a donation that established the following scholarship:
· BRUCE E. TRUMBO SCHOLARSHIP, established in 2008

Refer to Appendix C for more information about scholarships.

Finally, we must mention our office staff as a Departmental resource. Our staff members’ contributions have been vital to the well-being of the Department. Our former Administrative Support Coordinator, Raquel Arcia, served in the lead staff role and had done a remarkable job assisting faculty and students. However, she retired on October 22, 2018.

2.8 Requirements

Our programs do not require more than the typical minimum number of units (120).
3. Plan

3.1 Curriculum

Background: For the past two years, the department has been working on establishing a revised curriculum for which the implementation is to coincide with semester conversion, effective Fall 2018. Since we have a brand new curriculum this semester, the department does not anticipate any major changes to curriculum over the next five years but realizes that it may have to make smaller curricular changes to meet the needs of its students over the next few years. See below for specifics for each of our programs.

MS Statistics:
1. Effective Fall, 2018, the department has replaced the “Computational Statistics” option with the “Data Science” concentration. The other three options are now called concentrations: Applied Statistics, Mathematical Statistics, and Actuarial Science.
2. We have been offering Data Science courses over the last few years and they have been immensely popular which lead to the development of this new concentration. We do not anticipate any major changes over the next few years other than possibly creating new electives.
3. In order to continue to offer a diverse selection of electives for our students, most of these electives are 2-unit, 7-week (half-semester), courses which allow most students to take up to five electives over the course of the program. The only substantial change anticipated to this would be the choice of which to try and offer during the academic year and which to try and offer during summer session (through extension).
4. The capstone experience will continue to be the comprehensive exam. Under semesters, this is now taken as part of a 2-unit course, STAT 692.

MS Biostatistics:
1. A new biostatistics course, Longitudinal Data Analysis, was added to the curriculum under semesters to join the other biostatistics courses (Categorical Data Analysis, Survival Analysis, and Clinical Trials). It will not be offered this year but we hope to develop the course to be offered as an addition to the program within the next five years.
2. A SAS course is not currently required for this program. However, we are considering adding this requirement in the next five years. We do currently offer two SAS courses online.
3. The capstone experience will continue to be the comprehensive exam. Under semesters, this is now taken as part of a 2-unit course, STAT 692.

BS Statistics and Minor:
1. Effective Fall, 2018, the department is offering a “Data Science” concentration for the BS Statistics program. Previously, there were no concentrations/options.
2. Under the Data Science concentration, it is possible to complete the BS Statistics degree without taking calculus. This is made possible by offering a new course in teaching STAT 321, Probability Through Simulation.
3. We currently have three GE courses: STAT 100 and STAT 101 satisfy B4 whereas STAT 401 satisfies D4. We may pursue getting approval for a B6 course.

All programs:
1. Since all of these curriculums are new and untested, we anticipate making adjustments to them to best serve our students and give them the best chance at an on-time graduation that we can.
2. We hope to develop more online courses at all levels; currently only two courses in SAS are offered in this medium. We recently received approval to develop an online version of STAT 101.
3. We plan to develop curriculum to address reproducible research. It is important that research is capable of being verified and built on externally.
4. We plan to develop curriculum that addresses cloud computing and big data, beyond what we already have.

3.2 Assessment

All PLOs were revisited and revised under semester conversion over the past two years. We do not plan to amend these again over the next five years.

Program Learning Outcomes are assessed annually via the Department’s annual report and below is the mapping to the Institutional Learning Outcomes (ILOs).

Student Learning Outcomes (SLOs) for BS in Statistics are:
1. Apply basic computational skill in descriptive statistics and graphical displays; hypothesis testing and confidence intervals; modeling and error analysis (ILO 1 & 6)
2. Communicate to others results involving descriptive statistics and graphical displays; hypothesis testing and confidence intervals; modeling and error analysis (ILO 1, 2, 3, 4, 6)
3. Analyze data using appropriate statistical computer software and to interpret the results covering descriptive statistics and graphical displays; hypothesis testing and confidence intervals; modeling and error analysis. (ILO 1, 2 & 6)

Student Learning Outcomes for MS in Statistics are:
1. Apply statistical methodologies, including a) descriptive statistics and graphical displays, b) probability models for uncertainty, stochastic processes, and distribution theory, c) hypothesis testing and confidence intervals, d) ANOVA and regression models (including linear, and multiple linear) and analysis of residuals from models and trends. (ILO 1, 6)
2. Derive and understand basic theory underlying these methodologies (ILO 1, 6)
3. Formulate and model practical problems for solutions using these methodologies (ILO 1, 2, 6)
4. Produce relevant computer output using standard statistical software and interpret the results appropriately (ILO 1, 2, 6)
5. Communicate statistical concepts and analytical results clearly and appropriately to others; (ILO 1, 2, 3, 4, 6) and
6. Understand theory, concepts, and terminology at a level that supports lifelong learning of related methodologies. (ILO 1, 2, 3, 6)

Student Learning Outcomes for MS in Biostatistics are:
1. Apply biostatistical methods to data, including (a) descriptive statistics, probability and graphical displays, (b) distributions, hypothesis testing and confidence intervals, and (c) uncertainty, likelihood, modeling and error analysis; (ILO 1, 6)
2. Derive basic theory and communicate to others results involving biostatistical data analysis; (ILO 1, 2, 3, 4, 6)
3. Formulate problem solutions, produce appropriate computer code and to interpret results. (ILO 1, 2, 4, 6)
For MS in Statistics we assessed SLO’s 1, 2, 3, 4, 5, and 6. For MS in Biostatistics we assessed SLO’s 1, 2, and 3. No SLO’s were assessed for Statistics BS in 2017-2018 academic year.

Summary of Assessment Process

Instruments: We have long used the culminating experience of the Comprehensive Examination along with feedback from alumni and community industry leaders in assessing our programs. Student learning outcomes and institutional learning outcomes were previously identified and mapped to specific courses for all three programs (refer to program curriculum maps, http://www.csueastbay.edu/csci/for-faculty-staff/assessment-semester.html).

We currently, and anticipate to continue to, use quantitative assessment of the results of our Comprehensive Examination by mapping all but one of the SLO’s for each of the MS programs to specific course problems on the MS exam. The comprehensive examination has a common (to both programs) 4-hour closed book examination and, four days later, program-specific 4-hour open book examinations. Questions on the examinations are identified with the required graduate courses. Rubrics were established for the outcomes and implemented.

The SLO’s that were not evaluated by the Comprehensive Examination involve communication skills (SLO #5 for Statistics MS and SLO #2 for Biostatistics MS). It was decided that these SLO’s are better addressed by term projects that involve communication (either a written project or presentation that is worth considerable weight in the grading scheme of the course). For the Statistics MS SLO #5, STAT 632 “Theory and Application of Regression” will be used for assessment. It should be noted that the assessment of MS SLO #5 is at the end of the first year of the program, while the other assessments are at the end of the program. For Biostatistics MS SLO #2, BSTA 663 “Clinical Trials in the Pharmaceutical and Biomedical Industries” is used for assessment.

For the Statistics BS program STAT 432 “Regression” was formally identified as the course to use for end-of-program assessment.

Sampling Procedure: We sample by gathering data from all students attempting to complete our capstone experience for all three programs. Specifically, the capstone experience for MS Statistics and MS Biostatistics is the comprehensive exam whereas the capstone experience for the BS Statistics is the regression course, STAT 432.

Sample Characteristics: All MS Statistics and MS Biostatistics at, or near, to the end of their program were identified. At the undergraduate level, all undergraduate majors completing STAT 432 are to be sampled.

Data Collection: The comprehensive exam is given twice a year, Fall and Spring. All tenure/tenure track faculty participate in the evaluation of student performances on this exam that are then used to evaluate the SLO’s. STAT 432 is given every Spring for which the SLO’s identified are assessed by the instructor on record. BSTA 663 is a required course for Biostatistics MS given every Spring semester. STAT 632 is a required course for Statistics MS and Biostatistics MS given every Spring semester.

Data Analysis: We currently utilize Google Sheets to incorporate the rubrics that were established for the outcomes, in order to analyze the data.
There are numerous career opportunities open to our graduate students during the next five years. First, an MS degree in statistics can help prepare students for jobs in a variety of sectors including technology, finance, public health, and education. A portion of our students are also currently employed, or have internships, and enroll in our program to gain additional analytic and quantitative skills relevant to their work. Second, our MS program is structured to help prepare students interested in continuing their education towards a doctorate in statistics or a related field (e.g., applied mathematics, computer science). Completing a Ph.D. program in statistics can lead to additional career opportunities such as post-doctoral research positions in academia and government, as well as junior faculty positions.

Our Department is modestly sized with seven full-time tenure-track faculty at the assistant professor, associate professor, or full professor levels. This includes two assistant professors that were recently hired to teach courses in the graduate program and Data Science concentrations. We expect that total enrollment will remain steady over the next five years. Any growth in enrollment will depend on hiring new faculty and continuing to grow the program.

A primary learning goal that we are in the process of addressing is to provide students with adequate training in statistical programming languages and computational methods for doing Statistics. The Department has adopted R and RStudio as the main language and platform for computing. A primary reason for this is that R and RStudio are both free and open source, and work well on any operating system (Windows, Mac). For two of our core first-year graduate courses, STAT 630 Statistical Methods and STAT 632 Regression, we provide students with access to a weekly computer lab, and also encourage students to bring their own machines and work on coding projects and exercises independently. For STAT 630, we have developed lab assignments that enable students to learn the basics of R programming, run simulation experiments that reinforce theoretical concepts, and work with a variety of data sets. Because of the switch to semesters, in the Regression and Statistical Learning courses (STAT 630 and STAT 652), we plan to cover modern methods such as cross-validation, model selection, regularization, regression trees / random forests, and neural nets that have become increasingly popular and useful in the past decade. Moreover, several of our faculty have active research programs in these areas. We believe that these changes will prepare students for a variety of careers in statistics, data science, and consulting.

A potential learning goal is to also provide students with training in other programming languages such as Python and SAS. The Department currently has some expertise and coursework in SAS, which is useful for students interested in pursuing careers in the health sciences. An undergraduate course in Exploring and Analyzing Data (STAT 315) is also primarily taught in Python. While R has become ubiquitous in the field of statistics, we hope that by further developing coursework that uses these other programming languages, we will provide students with a more well-rounded set of skills.

In terms of scheduling, we continue to offer afternoon and evening classes for our MS program. This includes courses offered from 8-9:50pm, two nights a week. By offering these afternoon and night courses, we are able to accommodate students that also work full time and commute to school. This approach to scheduling is one of the reasons our program has been able to grow over the past ten years.

The communication lines between students and faculty are open. All faculty members hold the required number of office hours for their classes. Our student population is diverse and we strive to
meet the individual needs of our students. In the future, we would like to enhance the level of support provided in the following areas: internships, scholarships, and research or teaching assistantships.

Some of our Masters students receive financial and/or Co-op Ed course credit by doing internships connected with companies in the private sector. At present, the students must find their own work situations and establish an agreement with the company before contacting our Department to gain approval to connect their work situation with the University. We would like to establish formal agreements with local companies in order to regularly offer Co-Ed opportunities for our Master’s students who are interested in this type of opportunity/experience.

Because we are part of the Cal State system our Department’s primary goal is to provide students with quality teaching and coursework. We encourage students to work on research projects as part of their coursework, and we are open to student collaboration in research papers and conference presentations with faculty. However, further developing this aspect of our program would require additional course release for faculty, and funding from internal or external grants.

3.4 Faculty

The main Department faculty changes, expected in the near future, are related to faculty stature within the University. We anticipate that Dr. Joshua Kerr will receive promotion to professorship effective Fall 2019. We also anticipate that our new assistant professors Dr. Eric Fox and Dr. Li Zou will be retained effective Fall 2019 and receive tenure and promotion by Fall 2024. Once all of our faculty members have achieved this career milestone, they should be able to devote more time to program enhancement and development. We are looking forward to all of our faculty members being tenured.

Currently we have one remaining FERPing faculty, Lynn Eudey. Her term was just begun and will end in five years, provided she chooses to use the full, allowable time. Two of our long-term contract lecturers have retired in the past two years and we are currently short of lecturers. Our Department will need to hire new tenure-track faculty and long-term lecturers to meet the demand for advanced classes offered by our Department and to deliver the undergraduate major and service courses.

Because of the efforts of staff and faculty, our Department continues growing. We have new options/concentrations in Data Sciences, of which the enrollment increases constantly. There are currently only a couple of faculty in the field and therefore we plan to hire new faculty to fulfill the need. Our future tenure-track faculty hiring requests will focus on Data Science, Statistical Education and Biostatistics. These are areas of knowledge that are needed by local companies, and they cannot find enough people to fill the positions.

All lines of communication are open between the Department Chair and the faculty and lecturers in the Department. Our policy is to spread advising responsibility throughout the faculty, and all of our faculty know student recruitment is a priority and everyone’s responsibility.

Additionally, our Department has worked hard to provide important support for our faculty through the Statistics Trust Fund and the Statistics Leadership Fund—which are funded through private donations. Currently, one faculty member (Emeritus) makes contributions to the Leadership Fund through monthly payroll deduction. Historically, donations to the Leadership account have also been made by alumni. These funds are used to help pay the cost for such things as Departmental events (e.g., luncheons, dinners), faculty travel to statistics conferences to make poster and other types of presentations, and the outside reviewer expenses for our Five-year Review. We also work hard to
provide financial support to our students and encourage them to apply for outside travel award to anticipate professional conferences. There are a few of scholarships funded by Emeritus faculty and alumni. We would like to undertake fundraising efforts to increase the size of these accounts, in order to provide more financial support to our students.

3.5 Resources

The current level of resources (tenure track faculty, staff, office space, dedicated computer lab space, cloud computing access, etc.) has not been adequate to fully support the maintenance or improvement of certain program’s quality during the next five years. Collectively we have been working with less and less support in the past 10 years, but we have hired 2 new tenure track faculty for the faculty who have recently retired. So we have been able to maintain our support level without seeing a further decline. We would like to be able to hire more faculty in the near future.

The Department of Statistics and Biostatistics is requesting 2 tenure-track searches at the level of Assistant Professor for the next academic year.

The proportion of undergraduate service and major classes being taught by lecturers is large. We historically have a low DFW rate in our STAT 1000 classes (STAT 100 under semesters). However, we anticipate that the rate will dip with students taking our course without having cleared remedial mathematics. Nonetheless, we anticipate a relatively low DFW rate in our B4 courses, including the brand new STAT 101.

Because of the increased demand on B4, almost all of the redesigned B4 courses that are meant to fall in line with the Chancellor’s state-wide initiative under EO 1110 have lecturers as the instructors of record. These are the students with the least preparation and, hence, the most need. We would like to hire a tenure-track faculty member who has a background related to Statistical Education who can help continue the development of new and current pedagogies to best serve our undergraduate population. Having such a person involved in the B4 and other undergraduate courses will provide students with a very positive, quality, experience that will help to grow the university’s overall retention and could enhance our undergraduate major program.

Specific to the graduate level, we have two programs with about 120 students combined. Serving this size of population has continued to result in hiring lecturers to teach even at this level, for lack of tenure/tenure-track faculty. We have a very good reputation in the Bay Area for our graduate programs and the students they produce. We would like to have the resources to continue to offer outstanding programs that put CSU East Bay in such a good light.

According to the CSUEB Dashboard data (trends can be found in Appendix A), the Department of Statistics and Biostatistics has high FTES, low FTEF, resulting in the highest SFR in the College of Science. Lowering SFR can benefit students in many ways, allowing for individual attention, better communication, and better recruitment and retention. Additionally, increasing tenure-track density should benefit not only our majors, but other departments and programs that we serve.

Without these searches, we will not have the ability to meet the needs of our undergraduate, graduate, and service-level students. Having lecturers dominate these service courses, teaching many of our major courses and even some graduate courses, with such a high SFR, is a detriment to the university’s mission on education.
We have recently lost our Administrative Support Coordinator and are currently searching for a long term replacement. With the size of our graduate program, and the extensive extra work necessitated by EO 1110, we would ask for 1.5 full time positions within the next five years.
EXTERNAL REVIEW REPORT
Department of Statistics and Biostatistics
California State University, East Bay
Professor Jessica Utts
Visit dates: February 5 – 6, 2019
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1. Introduction

The previous review of the Department of Statistics and Biostatistics took place in the 2010-11 academic year, and thus it has been 8 years since that review. During that time the campus has transitioned from quarters to semesters, which has given the department the opportunity to restructure its course offerings and requirements. In addition, Executive Order 1110 has had an impact on the need for quantitative general education courses, including statistics courses at the introductory level. Therefore, this review will focus on the current course offerings and degree requirements, rather than the prior ones that were in place during most of the review period.

The materials available for this review included a 5-year Program Review submitted by the department, department annual reports for the past six years, interviews with faculty and others during a two-day visit to the department in February, and the report from the previous departmental review conducted in 2010-11, which was supplied upon my request. I requested this last document in order to assess the extent to which its recommendations have been achieved in the interim.

The Cal State East Bay MS program is a gem in the Cal State system and in the Bay Area. East Bay is the only Cal State campus that offers graduate degrees in statistics and biostatistics that are not a subset of degree offerings in a mathematical sciences department. The only other Cal State campuses that offer MS degrees in Statistics of any type are Fullerton, Long Beach, San Diego and San Jose, and those are offered by more traditional math departments. Therefore, Cal State East Bay is in a unique position in the Cal State system.

This report covers issues related to the changing role of statistics as a discipline in order to provide context for the evaluation of the Cal State East Bay Department. The history of the CSUEB department is intricately interwoven with the history of Statistics departments more broadly, and the Department fares well in the larger picture of the discipline.

The subsequent sections of this report cover history and context; degree programs and courses; strengths, problem areas and opportunities; and conclusions and recommendations.
II. History and Context

One of the most important messages statisticians struggle to convey is that statistics is not a sub-discipline of mathematics and should not be treated as such. Historically many statistics programs started in math departments and then either split off to become separate departments, or grew as separate divisions of mathematics departments, which leads to the impression that statistics is a subset of mathematics. But that is not the case. Statistics as a discipline is inherently collaborative, and serves to enhance many areas of the biological, medical, physical and social sciences, as well as some parts of the humanities. For decades there has been a large need for statisticians in industry, especially in health-related and pharmaceutical jobs. In recent years statistics has taken on an even greater role in academia, industry and government, as technological progress has sky-rocketed. Modern statistics departments are evolving to keep up with these trends.

a. The Changing Focus of Statistics

The need for efficient data collection and analysis and the growing awareness of this need have created a very strong job market for well-trained statisticians. According to LinkedIn, “analytical reasoning” is the third-most important of the hard skills sought by companies in 2019. Artificial intelligence, which includes machine learning and incorporates many of the skills taught in statistics programs, is the second most important skill listed. The generic term “data science” is present in a large number of ads for industry jobs, and students trained in statistics have the skills needed to fill many of these jobs. Before the explosion of technology that has streamlined data analysis, jobs for graduates with BS degrees in statistics were not so abundant, and jobs for those with MS degrees were restricted to a limited number of industries such as health and finance. But all of that has changed in the past decade or so, and the demand for data scientists now outnumbers the supply. Therefore, many departments of statistics have seen impressive growth in the number of majors and the number of applicants for graduate programs.

The number of undergraduate statistics majors in US universities has grown rapidly in recent years. For example, data provided by the American Statistical Association\(^1\) showed that between 2011 and 2013 the number of undergraduate statistics majors at UC Berkeley grew from 88 to 143, at Purdue from 77 to 135, and at UC Davis from 32 to 53. Growth was even stronger from the period 2003-2005 to the period 2011-2013. In that time frame the number of statistics majors at UC Berkeley grew 224%, at Purdue it grew 875%, and at UC Davis it grew 233%. At CSU EB the number of undergraduate majors grew from 13 in 2010 to 32 in 2018, but the number of undergraduate degrees awarded each year has remained low, with 4 awarded in 2015-16 and 7 awarded in 2016-17.

At the PhD level, industry and government jobs for statistics graduates also exceed the supply. Given the differential in salaries between academic and industry jobs for statisticians, universities should expect to offer higher salaries for statistics faculty hires than for those in some other disciplines. And universities should take full advantage of the flexibility and job security that provide some of the benefits of academic jobs over those in industry. These market forces must be kept in mind when considering the constraints and opportunities for academic statistics departments if they are to be supported by a university that values their contributions.

In the rapidly evolving job market for data scientists a challenge for statistics departments is keeping the curriculum current. Faculty should be encouraged (and funded) to attend short courses at professional meetings, as well as to participate in webinars and other educational opportunities offered

\(^1\) [https://magazine.amstat.org/blog/2015/04/01/undergrad-stat-departments/](https://magazine.amstat.org/blog/2015/04/01/undergrad-stat-departments/)
by professional societies, and departments should annually evaluate their course content to make sure the latest developments are incorporated into the curriculum.

b. History of the CSU East Bay Department of Statistics and Biostatistics

According to Professor Emeritus Bruce Trumbo, the Cal State East Bay Department of Statistics and Biostatistics was started as the Department of Statistics in the mid-1960s, at a time when very few universities had separate statistics departments. The initial goal was to provide statistics service courses for the campus. Classes were as large as 200, with separate discussion sections, but that model did not serve the campus well, and thankfully, classes are now much smaller. At that time there were no computing resources for statisticians (other than large mechanical calculators) and the focus in statistics graduate programs internationally was on mathematical statistics and probability. Cal State Hayward became known as an excellent place to earn a Master’s degree in Statistics, as a feeder to PhD programs and for getting jobs in local industry.

The Department faculty numbers grew and shrank throughout the remainder of the 20th century. There were 10 faculty members in 1980. Catalogs found online show that the department had 8 faculty members in 1996, but had only 5 faculty members by 1999. Growth began again in the early 2000s, but the Department has never exceeded the number of 8 tenure-track faculty it had in 1996 or climbed to the high of 10 it had in 1980, in spite of large growth in enrollment in its courses and programs. At the time of this review there are 3 full professors (Fan, Suess and Zhou), 2 associate professors (Kerr and Chatterjee) and 2 assistant professors (Fox and Zou), for a total of 7 tenure-track faculty. Professor Mitchell Watnik holds a full professor title in the Department, but is working as a full-time Associate Dean of Undergraduate Programs and thus not active in the Department. Professor Lynn Eudey has entered the FERP program as Professor Emerita, and Professor Emeritus Bruce Trumbo is still active in departmental affairs, but not teaching regularly. In addition to the tenure-track faculty the Department relies on a large number of lecturers to cover its courses.

c. Current climate, personnel and staffing needs

As noted in the previous section, there are 7 active tenure-track faculty members and a large number of lecturers. In spite of the low number of tenure-track faculty for a department with so many graduate students, the faculty appear to value their positions and are strongly committed to the success of the department and program. Unlike at many universities, there is very low turnover in the faculty, and the collegial atmosphere is apparent and refreshing. In recent searches the department has been successful in recruiting high-quality assistant professors. The faculty all appear to be active in the profession, attending professional meetings and contributing to the scholarship of the discipline.

One of the recommendations in the previous review in 2011 was to hire five new tenure-track faculty members. Although 3 new assistant professors have been hired since that review (Chatterjee, Fox and Zou), one retirement (Eudey), one completion of FERP (Norton) and one move to the administration (Watnik) have left the net number of faculty the same, except with fewer full professors and more assistant professors.

One of the promising findings of this review is that the Dean of the College is very supportive of the Department, and willing to advocate for new faculty positions. That’s a very welcome development, and hopefully will help bring the department up to the staffing level it should have for a program of its size.

Another new personnel development in the past year is the use of graduate student teaching assistants and undergraduate learning assistants in the introductory statistics courses. The enrollment in these courses has increased substantially as a result of Executive Order 1110, requiring students at CSU to fulfill quantitative reasoning general education requirements. The courses Stats 100 and Stats 101 now have one-unit accompanying co-requisite courses for some students, Stats 100A and Stats 101A, which are taught by teaching assistants with help from undergraduate learning assistants. There are some logistical and pedagogical issues that need to be improved, and an upcoming assessment of those
courses should help focus awareness on potential improvements. Currently there is insufficient coordination between the regular Stats 100 and 101 classes and the accompanying Stats 100A and 101A.

One option for addressing the problems with the staffing and implementation of the introductory general education courses is to hire a faculty member with expertise in statistical education to oversee these courses. Currently it falls to the department chair to hire the teaching assistants and make sure the courses are coordinated. It would be ideal to have a faculty member with strong interest in statistical education coordinate and guide this process, and advise the department on pedagogical trends in courses of this type in other universities.

Regarding office staff, at the time of the campus visit for this review the department had only one full-time staff position, and it was being filled by a very competent, but temporary staff member. In the recent past the department has had a full-time staff member and a 0.5 student staff member. That level of staffing seems to be the minimum necessary to keep the faculty from having to spend time on routine administrative duties that could be undertaken by office staff.

d. Status of recommendations from the previous review

Two major recommendations were contained in the previous review, conducted in 2011. The first recommendation was to increase the faculty size by 5. That has not happened, and the number of tenure-track faculty remains the same as it was at the time of that review. Fortunately the current Dean is advocating for additional faculty positions in the near future.

The second recommendation was to increase the number of service course offerings. That recommendation must now be framed in the light of the curricular changes across the campus that occurred in the quarter to semester conversion, as well as the implementation of Executive Order 1110. The number of general education course offerings has increased as a result of the latter change. The service courses offered for other departments and majors have changed to fit the needs of those programs under semesters. There is no immediate need to implement the prior recommendation. However, the department should make sure that if statistics courses are to be taught on campus that they are taught by, or at least coordinated with, the Department of Statistics and Biostatistics.

III. Degree Programs and Courses

The Department offers M.S. degrees in both Statistics and Biostatistics, and a B.S. degree in Statistics. Historically and currently the largest enrollment by far is in the M.S. in Statistics degree program. The Department is known for this excellent program, and should make sure no conflicting priorities result in a dilution of this signature program.

a. MS degrees

Major changes have been made to the M.S. degrees in the past year, partly as a result of the conversion from quarters to semesters. One change unrelated to the conversion is the addition of a Data Science concentration and removal of the Computational Statistics option for the M.S. degree in Statistics. In addition to Data Science there are concentrations in Applied Statistics, Mathematical Statistics, and Actuarial Science. The introduction of the Data Science concentration coincided with the addition of several data science courses, which have proven to be quite popular as electives for students who are not in the Data Science concentration as well.

In the conversion from quarters to semesters the department implemented a brilliant strategy to make sure that a wide range of electives would still be available. They instituted the idea of half-term, 2 unit courses given over 7 weeks. These courses allow students to take two different electives in the same semester, taking each one for half of the time. In addition, the department started a 2-unit course that focuses on preparing students for their comprehensive exam, and then they take the exam as part of the
course. This strategy allows students to review material from several different courses in preparation for the exam, and to get feedback on their performance in practice exams. This course serves as the capstone experience for the M.S. degrees in Statistics and Biostatistics as well.

Another significant change since the last review is the creation of separate first-year courses for the M.S. degrees, rather than having those courses co-taught with the undergraduate version of the same material. This change benefits both the M.S. and the undergraduate students.

For the M.S. degree in Biostatistics, a major change has been the approval of a course in Longitudinal Data Analysis, which is a very important methodology course for biostatistics. The course has yet to be offered, but hopefully will be offered soon. Currently the requirements and courses for the M.S. degrees in Statistics and Biostatistics are somewhat similar. One suggestion made by a faculty member during the campus visit was to implement a course in handling large data in the health sciences. Such a course would differentiate the data science options for the statistics and biostatistics degrees. It also might be an attractive offering for students in the health sciences.

The number of M.S. graduates in Statistics and Biostatistics has fluctuated yearly, but the average is around 96 for Statistics and 28 for Biostatistics, for a total of about 124 per year. In contrast, in 2004-05 there were only 25 M.S. graduates. So the program enrollment has grown multifold in that time period, while the number of tenure-track faculty members has not. It is worth noting that UC Berkeley has only 52 students in its M.S. program, fewer than half the number in the CSU EB program.

Many of the students enrolled in the M.S. programs have jobs in the Bay Area already, so an important benefit of the programs is that the requirements can be completed in the evening. In recent years the department has done an excellent job of advertising the availability of the program, which is partially responsible for the growth in enrollment. As noted earlier, the M.S. program at CSU EB is a gem in the Bay Area, and it is important to maintain the quality and reputation it currently holds.

b. BS degrees
The department has never had an undergraduate program that comes close to the size of its M.S. program. As undergraduate statistics programs grow nationally, there is a golden opportunity for the B.S. program at CSU EB to grow as well. One benefit of a modest growth in the program would be that the undergraduate class sizes would come closer to the ideal of around 35 students. However, any attempt to grow the size of the B.S. program should not be done at the expense of the M.S. programs, so new resources will be required if the campus is to take advantage of this excellent opportunity.

As of Fall 2018, the B.S. degree has a new concentration in Data Science, which does not require calculus. Instead, there are new courses that use computer-intensive methods to replace the mathematical statistical methods taught in the more traditional programs. It will take several years for the department to assess the success of this new approach, particularly with regard to the employability of its graduates. Undergraduate students who wish to continue to graduate school in statistics should be advised to take more mathematics than required for the data science concentration.

According to the department self-study, recently the number of students with a minor in statistics has increased. This trend also has been happening across the country, and should be encouraged. Not only do statistics minors help bring up the enrollment in courses for the major, but having a minor in statistics can help students with other majors be more employable when they finish their degrees.
c. Service courses
The largest service course offerings by the department are Stats 100 and 101, which are B4 general education courses. As mentioned elsewhere in this report, those courses are due for an assessment, and hopefully some suggestions for improvement will emerge. From discussions during the campus visit it seems that better coordination among the sections and the co-requisite Stats 100A and 101A would increase the quality of these courses. Given that most of the sections of these courses are taught by lecturers, it may be beneficial to create a standardized curriculum and timeline. If the department is able to hire a specialist in statistics education during the next round of faculty hiring, it would be ideal to place that person in charge of coordinating these courses.
There are other service courses offered by the department, some of which are specifically offered for other campus majors. A model used at other universities is to offer courses for the undergraduate statistics major that also serve as electives for other majors on campus. For instance, a first course in regression analysis often is seen as a desirable elective for students in the social and physical sciences.

IV. Strengths, Problem Areas and Opportunities
This section is organized around strengths, problem areas and opportunities that may be specific to certain degree programs or may cut across them. It should serve to inform the department and administration about what is working well and what needs attention.

a. Strengths
The Department of Statistics and Biostatistics has multiple strengths, including aspects that make it somewhat unique among comparison institutions. Here are some highlights:

- The M.S. degree is the only one in the Cal State system offered by a Department of Statistics. It is also one of the largest M.S. degree programs in California.
- The department provides an excellent orientation program for new graduate students, implemented by Professor Eric Suess. This orientation provides them with advice useful during their graduate careers and beyond.
- Professor Eric Suess has initiated a Friday research seminar, now offered as a course. Such an opportunity is rare in M.S. programs, and more typical in PhD programs.
- It is possible to complete the M.S. degree in the evening, which is not common for regular statistics graduate programs. It is more common for professional master’s degrees, for which the tuition and fees are typically much higher than they are for regular CSU and UC programs.
- The option of completing a B.S. degree in statistics with a data science option without taking calculus is quite unusual, and should be attractive to students with strong computing skills.
- The transition from quarters to semesters was done very well; in particular the introduction of two-unit, half-semester courses was insightful and allows students to learn a larger variety of statistical methods than would otherwise be possible.
- The department has done a nice job of introducing new courses to keep up with industry trends, most notably those introduced for the data science concentrations at both the M.S. and B.S. levels.
- At the B.S. level, student retention rates seem to be well above the campus average.

b. Problem Areas
Most of the problem areas identified have to do with lack of resources, and may not be able to be improved upon without additional resources. However, it’s worth identifying them in case creative solutions can be found.

- The department has the highest student faculty ratio in the College, and relies much too heavily on lecturers to teach the undergraduate courses. One of the major opportunities for the department is in
the growth of the undergraduate major, but without additional tenure-track faculty this may not be possible.

- The Stats 100 and 101 courses need better coordination, especially with the accompanying Stats 100A and 101A.
- There seems to be a lack of recognition across the campus that statistics is not a subset of math. This problem was illustrated most clearly when the name of the Math and Stat Lab was changed to simply be the Math Lab. Another example that plagues statisticians housed in math departments across the country is that attracting high quality faculty members in statistics requires higher salaries (in general) than for math faculty to be competitive with industry. Without obtaining salary data for CSU EB, it is not clear whether this is a problem for the department, but it is something that the administration must be aware of for future hires.
- The allocation of only one staff member for the department is problematic for multiple reasons. First, there are lost opportunities such as contacting alumni for scholarship contributions and/or providing a newsletter to alumni that could be implemented with additional staff. Second, there is no opportunity for cross-training, so if the one staff member is unable to continue or needs an extended absence there is no cover. Third, there are tasks that could be done by staff that take up valuable faculty time such as making copies, and even routine advising of undergraduate students.
- In spite of requests to do so, the department has not been able to access Cloud computing resources. LinkedIn named Cloud computing expertise as the #1 hard skill requested for jobs in 2019.
- There may be problems with sufficient enrollment in courses for the undergraduate major. Solutions include growing the major, or finding students from other majors who could benefit from taking those courses.
- Regarding the undergraduate major, it was mentioned that there is a computer science course that can be a bottleneck for statistics majors. The College should figure out how to ensure priority enrollment in that course for statistics majors.

c. Opportunities

There are multiple opportunities for growth, and the department and administration should consider which ones they wish to pursue. But none of these growth opportunities should be undertaken without additional resources, and they should not interfere with maintaining the quality of the current M.S. degree programs.

- As noted elsewhere in this report, enrollment in undergraduate statistics and data science majors has grown enormously in the past few decades. CSU EB has the opportunity to grow the undergraduate statistics major from its current low numbers, especially with the new data science option. Growth could come by advertising the major more widely with currently enrolled CSU EB students. But it could also be implemented by reaching out to high school Advanced Placement Statistics classes, and to local community colleges. A wonderful resource for materials to recruit students to statistics majors can be found at the website https://thisisstatistics.org/. There is a promotional toolkit available under the “educators” tab, https://thisisstatistics.org/educators/.
- The department does not appear to keep in contact with its alumni, at least not in recent years, although in the past there was a newsletter sent to them. This lack of contact is a missed opportunity for fund-raising, possible internships for current students, visitors to give seminars about their work, and probably other resources that alumni could provide.
- The Biostatistics M.S. program currently is much smaller than the Statistics M.S. program, yet apparently many M.S. graduates from both programs take jobs in the health sciences. There is
almost surely an opportunity to expand that program, especially among people currently working in the health sciences in the Bay Area. The department could consider adding a data science option to the Biostatistics M.S. degree as well, by adding one or two courses about dealing with large health-related data sets.

V. Conclusions and Recommendations
Most of the recommendations and conclusions provided in this section are described in more detail in previous sections, so they should be read in the context of the remainder of the report.

a. Conclusions
The major conclusion of this review is that the Department of Statistics and Biostatistics continues to offer a strong M.S. degree program, unique to the Cal State system and to the Bay Area. It does so with limited resources and many fewer faculty than should be required for a program of its size. What suffers are the undergraduate program and the undergraduate service courses, both of which are mostly covered by lecturers. The department is well positioned to increase the number of undergraduate majors by a large amount, if additional tenure-track faculty can be hired.

b. Recommendations
- The Dean of the College of Science is supportive of the need for additional tenure-track faculty and should continue to advocate for growth in the number of faculty. The previous review recommended adding five faculty positions, and that number remains realistic.
- The department should allocate one new faculty position to hire someone with expertise in Statistics Education. That faculty member could oversee the growth of the general education offerings and the undergraduate major, as well as inform the rest of the faculty about pedagogical advances in statistics education.
- Even without hiring someone with expertise in statistical education the department should assess the current situation with the general education courses Stats 100 and 101, and make an effort to coordinate them better with the concurrent Stats 100A and 101A.
- Assuming additional faculty positions are available, the department should make an effort to substantially increase the number of students in the undergraduate major.
- To grow the undergraduate program, the department should reach out to local Advanced Placement Statistics teachers as well as to local community colleges.
- The current staff of one is insufficient for anything except the most basic maintenance of department functions. At least an additional 0.5 staff member should be added. If this isn’t possible, then perhaps certain functions of the department could be handled by staff in the Dean’s office.
- Assuming additional staff resources are available, the department should make an effort to reach out to alumni. Alumni could be a valuable resource for fund-raising, internships and departmental seminars that would help current students understand what statisticians do after they graduate.
- The department should continue its efforts to recruit students for the M.S. program from the Bay Area.
- The department should continue to focus on modernizing the M.S. programs and keep current with trends in industry for graduates of the M.S. programs.
5. Program Response to External Reviewer(s)’ Report

The responses will be directed at each of the sections, as labeled by the external reviewer in section 4 of this document.

History and Context

Dr. Utts noted that the department, in terms of tenure-track faculty, is smaller now (7) than it was in 1996 (8) and 1980 (10). This is despite all of our programs seeing tremendous growth over those same periods. Dr. Utts also points out that even though three new hires took place since the last 5-year review, the net number of faculty remain the same.

Response: the department is approved for two searches next year and hopes to grow even more in the years following.

Dr. Utts points out the existence of some logistical and pedagogical issues with the new B4 courses, designed in response to Executive Order 1110.

Response: The department looks forward to assessing those courses once this year is over to improve upon these issues.

Dr. Utts also notes the existence of statistics courses that are being taught outside of, and without consultation with, the Statistics Department.

Response: It is worth noting that this has been happening for years, especially in the Business Analytics program, despite the Statistics Department’s objections. Other programs are also currently teaching/developing courses wherein they are teaching statistics without any prerequisite or consultation with the Statistics Department.

Degree Programs and Courses

In regards to the Statistics, M.S. program, Dr. Utts states “The Department is known for this excellent program, and should make sure no conflicting priorities result in a dilution of this signature program.” Furthermore, Dr. Utts mentions the Department’s “brilliant strategy” to offer half-term, 2-unit courses to allow for a wide range of electives.

Response: The department will continue to make every effort to ensure the quality of our programs to best serve our students.

In regards to the undergraduate program, Dr. Utts notes that undergraduate statistics programs are growing nationally. One of the strategies for growing our undergraduate program is the inception of a calculus-free pathway through the B.S. degree via a concentration in Data Science, mentioning that this may take years to assess the success of this approach.

Response: The Statistics Department will be sure to keep track of this pathway to see if it results in an increase in undergraduate majors.

For our service courses, Dr. Utts points to potentially improving the B4 courses (STAT 100 and STAT 101) by having better coordination between the parent and support courses.

Response: The Statistics Department will assess the implementation of these courses with feedback from students, TAs, and instructors in order to make improvements going forward.

Strengths, Problem Areas and Opportunities
According to Dr. Utts, “Most of the problem areas identified have to do with lack of resources, and may not be able to be improved upon without additional resources”

Response: The Statistics Department will continue to do the best we can with the resources we have while looking for additional sources of funding.

Dr. Utts discusses a common stigma with Statistics in academia “There seems to be a lack of recognition across the campus that statistics is not a subset of math. This problem was illustrated most clearly when the name of the Math and Stat Lab was changed to simply be the Math Lab. Another example that plagues statisticians housed in math departments across the country is that attracting high quality faculty members in statistics requires higher salaries (in general) than for math faculty to be competitive with industry. Without obtaining salary data for CSU EB, it is not clear whether this is a problem for the department, but it is something that the administration must be aware of for future hires.”

Response: When the name for the Math Lab was determined, the Stats department offered some ideas to incorporate “statistics” in the name, but was ultimately turned down. Unfortunately, this will only perpetuate the misnomer that Statistics is just part of Mathematics. The Statistics Department also hopes that administration will consider these insights when looking at salary offers for new hires and adjustments for existing faculty.

Conclusions and Recommendations

In summary, Dr. Utts concludes “The major conclusion of this review is that the Department of Statistics and Biostatistics continues to offer a strong M.S. degree program, unique to the Cal State system and to the Bay Area. It does so with limited resources and many fewer faculty than should be required for a program of its size. What suffers are the undergraduate program and the undergraduate service courses, both of which are mostly covered by lecturers. The department is well positioned to increase the number of undergraduate majors by a large amount, if additional tenure-track faculty can be hired.”

Response: The Statistics Department hopes to hire more tenure-track faculty in the near future to address these concerns.

Dr. Utts recommends the hiring of five new faculty positions.

Response: The Statistics Department feels this is reasonable and agrees that this would help to grow the undergraduate program.

The lack of staff was pointed out by Dr. Utts as a reason for the lack of tracking and communicating with alumni.

Response: The Statistics Department agrees that without additional staffing, it is not reasonable to proactively reach out to alumni and use them as the valuable resource they are.

Dr. Utts encourages the department to continue to focus on modernizing the M.S. programs.

Response: As mentioned earlier in the report, the Department has been unsuccessful in implementing modern cloud computing but hopes to achieve this in the near future with continued efforts.
## APPENDIX A

CALIFORNIA STATE UNIVERSITY, EAST BAY

APR SUMMARY DATA

FALL 2010-2018

### Statistics

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**Instructional FTE Faculty**

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**Lecturer Teaching**

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**D. Student Faculty Ratios**

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### SFR By Level (All Faculty)

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Source and definitions available at: [http://www.csueastbay.edu/ira/apr/summary/definitions.pdf](http://www.csueastbay.edu/ira/apr/summary/definitions.pdf)

### Fall Quarter

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### D. Student Faculty ratios

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New Faculty Justification: Department of Statistics and Biostatistics (2011)

Justification:

1. Overview.

Applied/Large Data/Computational/Statistician/Biostatistician

The position we seek to fill in the Department of Statistics and Biostatistics is one that will meet many needs. We hope to find an excellent candidate who can participate in the teaching of graduate classes in the area of applied statistics with emphasis on applied applications of statistics to large data problems using modern computational techniques and software. The areas of application we seek are: Biostatistics, Computational Statistics, Statistical Learning, Large Data, and possibly Actuarial Science.

2. Helping the Department, College and University with strategic goals.

The addition of a new faculty member to the Department of Statistics and Biostatistics will help the Department continue its growth in the areas we are currently offering through our MS Statistics program (currently with four Options), our MS Biostatistics (PSM), and our BS Statistics program. In addition, a new faculty member will allow us to branch into new areas of the application of statistics relevant to the local job market.

Starting with the last rounds of faculty searches we were able to hire new faculty to support the strategic goals of 1) strengthening the applied and computational expertise of the faculty, 2) acquiring faculty with expertise in Biostatistics (which led to the creation of our MS in Biostatistics, a program which was approved Fall 2009 by CGS as a PSM), and 3) further developing our BS Statistics program (which has shown slow but steady growth over the last five years).

Hiring a new faculty member will help sustain the growth we have seen in the last five years and fill in the gaps in our current course offerings. Two areas of instruction that have been limited in recent years by losses in faculty are: 1) the offering of some core and elective courses in our MS programs (Computational Statistics, Statistical Learning, SAS programming with large data, Multivariate Statistics, Bayesian Statistics, Bioinformatics, and others) and 2) the continued offering of our upper-division GE courses in Statistics (Stat 3040 and Stat 3050). These two courses have not been offered during the last two years due to a lack of faculty available to teach these classes.

Please note that we are very rarely able to hire lecturers with degrees in Statistics or Biostatistics—especially those with PhDs. So, apart from one lecturer we currently hire on a long-term contract, it is almost impossible to hire lecturers who are qualified to teach graduate classes or specialty classes. This problem has exited for many years. I have not been able to hire anyone with a PhD in Statistics since I became Chair five years ago.
A new faculty hire will allow us to continue to develop our programs and attract new students to the College of Science. With this new person we will be able to further support the prerequisite Statistics courses for the majors in the College of Science (e.g., the Departments of Engineering, Mathematics, Biology, Psychology, Nursing, and Health Science).

A new faculty hire will fit in perfectly with the University’s plans to become a STEM-centered university. With the increasing collection of data in science and in the business world, and the needs of companies to employ skilled people who can work with and analyze the available data for decision making purposes, this potential hire would be invaluable in increasing the Department’s ability to meet changing demands over the next decade and well into the current century.


The Department’s most pressing needs are in Computational Statistics and large data analysis. These skills can be applied to Biostatistics and other fields of science and business.

Additionally, there are a large number of Statistics classes that have not been offered in recent years because of 1) a lack of expertise in these areas and 2) the strain resulting from the growth in the SCUs in our Department. Concerning offering additional classes, our Department would gain tremendous benefit from the ability to again offer our upper-division GE courses.

4. Student Demand.

The demand for undergraduate classes in Statistics has increased as the number of incoming Freshman has increased. Almost all of the Statistics service courses have 50 students enrolled, while these courses have an academic capacity of 35. The steady growth in Statistics majors could be increased with additional tenured/tenure-track faculty. An additional new faculty member will enable us to carry forward the success of our MS programs.

Please see the Headcount Enrollment and Degrees Award figures below.
5. Strong reputation.

Our Department has an exceptionally strong reputation within the region, state, country, and internationally.

Each year we have a considerable number of international students enrolled in our programs. This is something we have worked hard to improve. We have made efforts to list our Department website on educational websites that have links to MS-level programs throughout the United States. In the past, we have also devoted considerable faculty and staff time to working with our international MS applicants to ensure all who are qualified are admitted to our program.

Many of our faculty members have connections to other statisticians nationally and internationally. Before faculty travel funds were cut, many of our faculty participated in conferences, presenting their research.
The quality reputation of our Department is underscored by the approval of our MS Biostatistics program as a PSM. The awarding of PSM status is a lengthy process, and the goal is achieved only after following specific guidelines and meeting stringent regulations. The bestowing of PSM status is significant on the following levels: 1) our program was the first to achieve this goal at CSUEB and 2) ours was the first Biostatistics program to achieve this goal within the CSU. It is an honor to be awarded PSM status.

With a new faculty member we fully expect to continue the presence of our faculty at conferences and other meetings, in order to continue to support the excellent reputation of our Department. Additionally, it is anticipated that the presence of a new faculty member will further enhance our Department’s reputation by enhancing the Department’s ability to remain competitive in training students to meet the ever-changing needs in the fields of Statistics and Biostatistics.

6. Faculty Composition.

   a. The number of faculty in your department who have left, retired, or are in the FERP program over the last five years; and the dates of those events (a retirement does not automatically justify a replacement.)

Over the last five years, the Department of Statistics & Biostatistics has lost one full-time faculty member to resignation and two to retirement (both entered the FERP program), as follows.

- Dr. Jaimyoung (Jamie) Kwon: resigned effective September 2009.
- Dr. Bruce Trumbo retired at the end of Winter Quarter 2006 and entered FERP Fall 2006. His FERP agreement will end in June 2011.
- Dr. Julia Norton retired in September 2009 and entered FERP Fall 2009. Her FERP agreement will end in June 2014.

   b. Ratio tt faculty to TFEF.

Ratio of total tenured/tenure-track faculty to total FTEF.

In 2009, the most current data we have available is as follows:

\[ 9/8.6 = 1.05 \]

In 2009, all faculty:

\[ 15/8.6 = 1.74 \]

   c. Why tt faculty over a part-time instructor?

The primary reason for hiring a tenured/tenure-track faculty member over a lecturer is that we almost never receive a query expressing interest in a temporary teaching position from people with degrees in
Statistics or Biostatistics. The job market for people with advanced degrees in these fields is excellent in the Bay Area, and we cannot compete with the salaries offered to these people by the private sector. We even have a difficult time hiring our current graduates or current master’s students to work as graders for our faculty, because (with the exception of international students on visas) most of our students are employed full-time in the private sector. Because of our inability to hire lecturers with degrees in Statistics, very few part-time instructors have the expertise to teach junior-level Statistics classes for our majors or for our graduate classes.

If we did not have PhD-level faculty with degrees in Statistics or Biostatistics, our programs would not be thriving.

   d. Ratio of majors to tt faculty.

In 2009,

\[ \frac{150}{9} = 16.67 \]

   e. Department SFR compared to College SFR

Department SFR = 34

   f. The need in the context of your five-year hiring plan. (Each Department must have a 5-year hiring plan in place before a new faculty request will be considered. The 5-year plan must emphasize which sub-disciplines within the department are designated as distinctive, and necessitate a T/TT faculty.)

The field of Statistics is ever-changing, ever-evolving. In the past, we added Options within our Master’s program (e.g., Actuarial, Computational) to keep up with these changes. More recently, we added a Master’s program in Biostatistics. In the future, we expect to add several new degree paths at either the undergraduate or graduate level to keep pace with the field’s progress.

In order to implement these plans we will need to hire a faculty member with expertise in these areas. Our first priority will be to hire an expert in computational statistical with expertise in large data analysis in order to continue to develop our Biostatistics MS program and to further develop our Computational Option in our MS Statistics program.

7. Curriculum

   a. percentage of teaching that satisfies GE requirements.

Information not available at this time. Over the last two years, we have been unable to offer Stat 3040 and Stat 3050, the primary Statistics courses utilized by students to meet GE requirements.

   b. On-line teaching required.

No. However, the possibility of teaching service courses on-line is something we might explore for the future.
c. Does the position represent a central component of a CSUEB student’s education?

Yes. Many undergraduate majors, both large and small, have a lower-division or upper-division Statistics requirement. Some majors require Statistics courses at both the lower-division and upper-division levels. In the College of Science, the following majors list Statistics courses as major requirements: Computer Science, Biology, Psychology, Nursing, and Engineering. Additionally, the Mathematics major also can include upper-division Statistics classes.

Outside the College of Science: 1) the Business College has Statistics requirements in the undergraduate and graduate Business programs and 2) in various other majors around campus there are Statistics requirements (e.g., Sociology, Economics).

8. Scholarship

a. potential for scholarly success

Based on the accomplishments of our recent hires, there is every reason to expect that a new hire will have great potential for scholarly success.

b. potential for external/internal support for scholarship

Based on the accomplishments of our recent hires, there is every reason to expect that a new hire will have good potential for internal support.

c. replacement critical

Yes.

d. maximize current resources

Yes.

e. Department raised funds effectively from external sources.

Yes, for scholarships for students.

9. Recruitment

a. How will your department ensure that hiring is performed with the diversity goals of the University in mind?

1. Planned recruiting at conferences, meetings, etc.

We hope to recruit for this position at the annual Joint Statistics Meetings (JMS). This event is sponsored jointly by the American Statistical Association (ASA), Institute of Mathematical Statistics (IMS), International Biometric Society, and Statistical Society of Canada.
Formal recruiting and interviewing through the JSM Employment Service was not feasible because of the notice and planning requirements. However, advance approval of the position announcement, hopefully with position number, will make it possible to distribute an estimated 300 copies of the "long" position announcement as follows: (i) on tables adjacent to the main registration area; (ii) at informational booths of willing organizations, including IMS, ASA Women's Caucus, Chinese Statistical Association; (iii) at informal mixers and receptions for recent PhDs and current graduate students; (iv) at poster sessions presented by various CSUH faculty and students; and (v) in personal conversations.

2. Advertisements in journals and newsletters:
   A. An announcement (approved "short" form) will be submitted for inclusion in the October, November, and December issues of Amstat News (published monthly by ASA) — recognized as the major place to post printed academic job announcements in statistics for the US (estimated cost $330 for 2007 search).
   B. An announcement (approved "short" from) will be placed in the October, November, and December issues of the IMS Bulletin (estimated cost for 2007 search: $140), and at no additional charge on the IMS jobs website (www.imstat.org/jobs).
   C. An announcement (approved “short” form) is planned for the newsletter of the ASA Women's Caucus (estimated cost for 2007 search: less than $100).

3. Web advertising. (no-cost postings)
   A. Announcements ("short" and "long") will be posted on our Departmental web site. Because of the course content our faculty members have put on this site, it is frequently visited by academic statisticians.
   B. An announcement (approved “short” form) will be submitted to the Florida State University statistics jobs website (www.stat.ufl.edu/vlib/jobs.html), a recognized center for such postings in statistics.
   C. An announcement (approved “short” form) will be submitted to the CSUEB Employment Development website.

4. Mailed announcements:
   A. Letters with announcements will be sent to an available list of departments with PhD programs in statistics/biostatistics/computational statistics (especially women and minority students).
   B. We will review the list of recipients of the CSU Forgivable Loan/Doctoral Incentive Program. Letters with announcements will be mailed to any/all individuals who appear to meet position requirements.

5. Personal contacts: Faculty members and alumni/ae will be encouraged to notify colleagues about this position.

   b. Is there a pressing need for a senior hire (tenured), either to ensure excellence or fill a leadership role?
All senior faculty members have retired in recent years, (see 6. above). Two of the three who entered the FERP program will have resigned from or completed their FERP agreement by June 2011; the third will complete her FERP agreement in June 2014.

Dr. Eric Suess, currently the most senior full-time faculty member, was hired in Fall 1998. He will have served two terms as Department Chair at the end of academic year 2011-12.

The remaining full-time faculty (Drs. Shenguha (Kelly) Fan, Mitchell Watnik, Lynn Eudey, Josh Kerr, and YanYan Zhou) are relatively new hires (Fall 2005: Fan and Watnik, Fall 2006: Eudey and Kerr, and Fall 2007: Zhou). Although each of these faculty members brings much-needed knowledge and skills to the Department, it is unlikely that any of them would be prepared to assume the position of Chair in the near future. Thus, it would be highly advantageous to the Department to be approved to hire a senior (tenured) faculty member with the intent that he/she be groomed to serve as the next Chair.

c. Can you collaborate with another department on advertising or other costs of recruitment?

It is not feasible for us to collaborate with another department on advertising. However, our advertising costs are minimal (see information in #9).
New Faculty Justification:
Department of Statistics and Biostatistics (2013)

Justification:

10. Overview.

Applied/Large Data/Computational Statistician/Biostatistician

The position we seek to fill in the Department of Statistics and Biostatistics is one that will meet many needs. We hope to find an excellent candidate who can participate in the teaching of graduate classes in the area of applied statistics with emphasis on applied applications of statistics to large data problems using modern computational techniques and software. The areas of application we seek are: Biostatistics, Computational Statistics, Statistical Learning, Large Data, and possibly Actuarial Science.

As noted by our external reviewer (Dr. M. E. Bock) in our 2011 5-Year Review:
“East Bay is the only one of the California State Universities with a separate statistics or biostatistics department and, in spite of its relatively small faculty size, the department has the largest graduate program offerings in the College of Science as noted in the Self Study. It competes very successfully with other freestanding master’s programs throughout the United States…. The program is a unique asset of the College and the University and provides a special advantage to the students who receive its degrees. They find themselves in demand in the Bay Area and any place else where employers have serious data analysis needs.”

Our plan is to hire new faculty to explore the new computationally intensive areas of statistics and biostatistics. To quote Dr. Bock, this “is one of the fastest growing areas of research, yet it is also in the greatest demand from industry and interdisciplinary collaborations.” Dr. Bock’s first and foremost recommendation was to increase the Department’s faculty size. An increase in faculty would enable the Department to explore serious growth in computationally intensive statistics/biostatistics and to increase the number of service courses needed to support the quantitative thinking skills of the students in the University.

11. Helping the Department, College, and University with Strategic Goals.

The addition of a new faculty member to the Department of Statistics and Biostatistics will help the Department continue its growth in the areas we are currently offering through our MS Statistics program (currently with four Options), our MS Biostatistics (awarded the status Professional Science Master’s [PSM] program), and our BS Statistics program. In addition, a new faculty member will allow us to branch into new areas of the application of statistics relevant to the local job market.

Starting with the last rounds of faculty searches we were able to hire new faculty to support the strategic goals of 1) strengthening the applied and computational expertise of the faculty, 2) acquiring
faculty with expertise in Biostatistics (which led to the creation of our MS in Biostatistics, a program which was approved Fall 2009 by CGS as a PSM), and 3) further developing our BS Statistics program (which has shown slow but steady growth over the last five years).

Hiring a new faculty member will help sustain the growth we have seen in the last five years and fill in the gaps in our current course offerings. Two areas of instruction that have been limited in recent years by losses in faculty are: 1) the offering of some core and elective courses in our MS programs (Computational Statistics, Statistical Learning, SAS programming with large data, Multivariate Statistics, Bayesian Statistics, Bioinformatics, and others) and 2) the continued offering of our upper-division GE courses in Statistics (Stat 3040 and Stat 3050).

Please note that we are very rarely able to hire lecturers with degrees in Statistics or Biostatistics—especially those with PhDs. So, apart from one lecturer we currently hire on a long-term contract, it is almost impossible to hire lecturers who are qualified to teach graduate classes or specialty classes. This problem has existed for many years. I have not been able to hire anyone as a lecturer who holds a PhD in Statistics since I became Chair in Fall 2006.

A new faculty hire will allow us to continue to develop our programs and attract new students to the College of Science. With this new person we will be able to further support the prerequisite Statistics courses for other majors in the College of Science (e.g., the Departments of Engineering, Mathematics, Biology, Psychology, Nursing, and Health Science).

A new faculty hire will fit in perfectly with the University’s plans to become a STEM-centered university. With the increasing collection of data in science and in the business world, and the needs of companies to employ skilled people who can work with and analyze the available data for decision making purposes, this potential hire would be invaluable in increasing the Department’s ability to meet changing demands over the next decade and well into the current century.


The Department’s most pressing needs are in Computational Statistics and large data analysis. These skills can be applied to Biostatistics and other fields of science and business. This position will fill curricular gaps and help to meet student demands as summarized below and in section 4.

Additionally, there are a large number of Statistics classes that have not been offered in recent years because of 1) a lack of expertise in these areas and 2) the strain resulting from the growth in SCUs in our Department. Concerning offering additional classes, our Department would gain tremendous benefit from the ability to again offer our upper-division GE courses. And we could address the statistics job-market demands by offering courses in computational statistics, analysis of large data sets, and actuarial science.

In our recent 5-Year Review (2011) we were externally reviewed by Dr. M.E. Bock (Dr. Bock also participated as the external reviewer in our previous two 5-Year Reviews). Dr. Bock mentioned the need to increase the number of faculty (she recommended hiring 5 new tenure-track faculty) to support our “large high quality graduate program” and give us the ability to offer more service courses to support the needs of the University. Dr. Bock wrote: “Especially in biotech and data information areas, private industry is a competing employer that continues to demand statisticians with graduate degrees.”

13. Student Demand.
The demand for undergraduate classes in Statistics has increased as the number of incoming freshman has increased. Almost all of the Statistics service courses have 45 to 50 students enrolled, while these courses have an academic capacity of 35. As of 2011, the average class size for all lower division undergraduate courses was 45.1. The steady growth in Statistics majors could be increased with additional tenured/tenure-track faculty. Dr. Bock (our external reviewer on the 5-Year Review) noted: “Even the currently offered service courses have unacceptably large class sizes that do not allow for much one-on-one interaction with the instructor.”

An additional new faculty member will enable us to carry forward the success of our MS programs. Our graduate programs have more than doubled in the last ten years but the number of tenured and tenure-track faculty has remained flat.

Please see the Headcount Enrollment and Degrees Awarded figures on the next page (as of 2011).

Our Department has an exceptionally strong reputation within the region, state, country, and internationally.

Each year we have a considerable number of international students enrolled in our programs. This is something we have worked hard to improve. We have made efforts to list our Department website on educational websites with links to MS-level programs throughout the United States. In the past, we have also devoted considerable faculty and staff time to working with our international MS applicants to ensure all who are qualified are admitted to our program.

Many of our faculty members have connections to other statisticians nationally and internationally. Before faculty travel funds were cut, many of our faculty participated in conferences, presenting their research. Our faculty continues to participate and present at national conferences on a limited basis.

The quality reputation of our Department is underscored by the approval of our MS Biostatistics program as a PSM. The awarding of PSM status is a lengthy process, and the goal is achieved only after following specific guidelines and meeting stringent regulations. The bestowing of PSM status is significant on the following levels: 1) our program was the first to achieve this goal at CSUEB and 2) ours was the first Biostatistics program to achieve this goal within the CSU. It is an honor to be awarded PSM status.

With a new faculty member we fully expect to continue the presence of our faculty at conferences and other meetings, in order to continue to support the excellent reputation of our Department. Additionally, it is anticipated that the presence of a new faculty member will further enhance our Department’s reputation by enhancing the Department’s ability to remain competitive in training students to meet the ever-changing needs in the fields of Statistics and Biostatistics.
15. Faculty Composition.

f. The number of faculty in your department who have left, retired, or are in the FERP program over the last five years; and the dates of those events (a retirement does not automatically justify a replacement).

Over the last five years, the Department of Statistics and Biostatistics has lost one full-time faculty member to resignation and three to retirement (all three entered the FERP program), as follows.

- Dr. Jaimyoung (Jamie) Kwon: resigned effective September 2009.
- Dr. Michael Orkin retired in September 2004 and entered FERP Fall 2004. He resigned from the FERP program effective Fall 2008.
- Dr. Bruce Trumbo retired at the end of Winter Quarter 2006 and entered FERP Fall 2006. His FERP agreement ended in June 2011.
- Dr. Julia Norton retired in September 2009 and entered FERP Fall 2009. Her FERP agreement will end in June 2014.

g. Ratio tenured/tenure-track faculty to FTEF.

Ratio of total tenured/tenure-track (tt) faculty to total FTEF.

The data for 2011 (the most current information we have available) is as follows:

\[
\frac{7}{7.7} = 0.91
\]

In 2011, the ratio for all faculty is:

\[
\frac{14}{7.7} = 1.82.
\]

h. Why tenured/tenure-track (tt) faculty over a part-time instructor?

The primary reason for hiring a tenured/tenure-track faculty member over a lecturer is that we almost never receive a query expressing interest in a temporary teaching position from people with degrees in Statistics or Biostatistics. The job market for people with advanced degrees in these fields is excellent in the Bay Area, and we cannot compete with the salaries offered to these people by the private sector. We even have a difficult time hiring our current graduates or current master’s students to work as graders for our faculty, because (with the exception of international students on visas) most of our students are employed full-time in the private sector. Because of our inability to hire lecturers with degrees in Statistics, very few part-time instructors have the expertise to teach upper-division Statistics classes for our majors or to teach our graduate classes.

If we did not have PhD-level faculty with degrees in Statistics or Biostatistics, our programs would not be thriving.

i. The number of majors and ratio of majors to tt faculty.

In 2011,
139/7 = 19.86.

j. Department SFR compared to College SFR.

In 2011 Department SFR = 35 for Statistics (all levels) and SFR = 22 for Biostatistics graduate program.

g. The need in the context of your five-year hiring plan. (Each Department must have a 5-year hiring plan in place before a new faculty request will be considered. The 5-year plan must emphasize which sub-disciplines within the department are designated as distinctive, and necessitate a T/TT faculty.)

The field of Statistics is ever-changing, ever-evolving. In the past, we added Options within our MS Statistics program (e.g., Actuarial, Computational) to keep up with these changes. More recently, we added a MS Biostatistics program. In the future, we expect to add several new degree paths at either the undergraduate or graduate level to keep pace with the field’s progress.

In order to implement these plans we will need to hire a faculty member with expertise in these areas. Our first priority will be to hire an expert in computational statistics with expertise in large data analysis in order to continue to develop our MS Biostatistics program and to further develop our Computational Option in our MS Statistics program.

In our recent 5-Year Review, Dr. Bock recommends hiring five new faculty members to maintain the quality of the Department’s graduate programs, to grow into the “extremely promising” areas of computationally intensive statistics/biostatistics. A larger faculty will also enable the Department to offer more service courses to provide undergraduates with the quantitative reasoning needed in today’s marketplace.


d. Percentage of teaching that satisfies GE requirements.

The Department of Statistics and Biostatistics offers two lower-division GE courses, Stat 1000 and Stat 2010. Six to eight sections of these courses are offered every quarter with enrollments well above the academic capacity of 35 (usually 45 or more students are enrolled per section). Over the last seven years (including the projected course offerings for 2012-13), we have been unable to offer Stat 3040, one of the primary Statistics courses used to meet upper-division GE requirements. Stat 3050, another primary Statistics course utilized by students to meet upper-division GE requirements, has been offered most of the years since 3040 has not been offered.

Over the 2011-2012 academic year, the percentage of sections in GE courses is 29%.

e. Will online teaching and/or teaching at another campus site (Oakland/Concord) be a requirement of this position?
No. However, the possibility of teaching service courses on-line is something we might explore for the future. And our service courses are offered at the Concord campus (usually these are taught by lecturers).

f. Does the position represent a central component of a CSUEB student’s education?

Yes. Many undergraduate majors, both large and small, have a lower-division or upper-division Statistics requirement. Some majors require Statistics courses at both the lower-division and upper-division levels. In the College of Science, the following majors list Statistics courses as major requirements: Biology, Computer Science, Engineering, Nursing, and Psychology. Additionally, the Mathematics major (both undergraduate and graduate programs) also can include upper-division/graduate Statistics and Probability classes taught by Statistics faculty. (Statistics faculty writes and grades the Probability portion of the Mathematics Comprehensive Examination.)

Outside the College of Science: 1) the Business College has Statistics requirements in its undergraduate and graduate Business programs and 2) various other majors throughout campus utilize Statistics courses as major requirements (e.g., Sociology, Economics).

17. Scholarship/New Sources of Revenue

e. Potential for scholarly success.

Based on the accomplishments of our recent faculty hires, there is every reason to expect that a new hire will have great potential for scholarly success.

g. Potential for external/internal support for scholarship.

Based on the accomplishments of our recent faculty hires, there is every reason to expect that a new hire will have good potential for internal support.

h. Is a replacement critical to the scholarly/research/creative efforts of units both in- and outside of the department or college? Does the position have the support of other colleges?

Yes, the replacement is critical. In our recent 5-Year Review we were externally reviewed by Dr. M. E. Bock. Dr. Bock was also our external reviewer for the previous two 5-Year Reviews. First and foremost Dr. Bock recommended hiring tenure-track (senior) faculty to support our graduate programs and to increase the number of Statistics service courses needed by the University. Although we have had five relatively new hires, we have also had one resignation and three retirements. In June 2014 Dr. Julia Norton’s FERP appointment will end. Dr. Bock also noted that Statistics major student demands have more than doubled since the previous 5-Year Review.

i. What has the unit done to maximize its current resources (i.e., to help itself?) over the past five years?

The Department has maintained a nationally competitive master’s program with limited resources. In the past five years Statistics and Biostatistics has lost two senior faculty members (Orkin, Trumbo), one junior faculty member (Kwon), and another senior faculty member is on FERP (Norton) to end in June
Although the faculty size has remained flat since 2004-2005, the graduate programs have more than doubled.

The Department support staff has been reduced and the faculty has assumed responsibility for undergraduate student assessment and graduate student administration.

The Department is reliant on lecturers to teach the undergraduate service courses so that our faculty can teach graduate and upper division courses. Recently we have implemented computer-graded homework in the large service courses.

j. Has the Department raised funds effectively from external sources? Has it worked effectively with external agencies and constituencies?

Yes, for student scholarships and Department Trust and Leadership accounts. These are listed in the order they were endowed:

Heebok Park Scholarship
George J. Resnikoff Memorial Scholarship
Statistics Department Scholarship
Justin Randle Memorial Scholarship
Bruce E. Trumbo Scholarship

18. Recruitment.

a. How will your department ensure that hiring is performed with the diversity goals of the University in mind?

1. Planned recruiting at conferences, meetings, etc.:
We hope to recruit for this position at the annual Joint Statistics Meetings (JMS). This event is sponsored jointly by the American Statistical Association (ASA), the Institute of Mathematical Statistics (IMS), the International Biometric Society, and the Statistical Society of Canada.

Formal recruiting and interviewing through the JSM Employment Service in August 2013 will be possible (estimated cost $3,000.00). In addition, advance approval of the position announcement, hopefully including the position number, will make it possible to distribute an estimated 300 copies of the "long" position announcement as follows: (i) on tables adjacent to the main registration area; (ii) at informational booths of consenting organizations, including IMS, ASA Women's Caucus, Chinese Statistical Association; (iii) at informal mixers and receptions for recent PhDs and current graduate students; (iv) at poster sessions presented by various CSUEB faculty and students; and (v) during personal conversations.

2. Advertisements in journals and newsletters:
A. An announcement (approved "short" form) will be submitted for inclusion in the October, November, and December issues of Amstat News (published monthly by ASA) — recognized
as the major place to post printed academic job announcements in statistics for the US (estimated cost for 2007 search: $330.00).
B. An announcement (approved "short" form) will be placed in the October, November, and December issues of the *IMS Bulletin* (estimated cost for 2007 search: $140.00), and at no additional charge on the IMS jobs website (www.imstat.org/jobs).
C. An announcement (approved “short” form) is planned for inclusion in the newsletter of the ASA Women's Caucus (estimated cost for 2007 search: less than $100.00).

3. **Web advertising (no-cost postings):**
   A. Announcements ("short" and "long") will be posted on our Departmental web site. Because of the course content our faculty members have included on this site, it is frequently visited by academic statisticians.
   B. An announcement (approved “short” form) will be submitted to the Florida State University statistics jobs website (www.stat.ufl.edu/vlib/jobs.html), a recognized center for such postings in statistics.
   C. An announcement (approved “short” form) will be submitted to the CSUEB Employment Development website.

4. **Mailed announcements:**
   A. Letters with announcements will be sent to an available list of departments with PhD programs in statistics/biostatistics/computational statistics (especially women and minority students).
   B. We will review the list of recipients of the CSU Forgivable Loan/Doctoral Incentive Program. Letters with announcements will be mailed to any/all individuals who appear to meet position requirements.

5. **Personal contacts:** Faculty members and alumni/ae will be encouraged to notify colleagues about this position.

   d. Is there a pressing need for a senior hire (tenured), either to ensure excellence or fill a leadership role?

All senior faculty members have retired in recent years (refer to page 5 above, “6. Faculty Composition”). Two of the three faculty members who entered the FERP program have fully retired (2008, 2011). The third faculty member who entered the FERP program will complete her FERP agreement in June 2014.

Dr. Eric Suess, currently the most senior full-time faculty member, was hired in Fall 1998. He began serving his third term as Department Chair Fall Quarter 2012.

The remaining full-time faculty, Drs. Shenguha (Kelly) Fan, Mitchell Watnik, Lynn Eudey, Josh Kerr, and YanYan Zhou, are relatively new hires (Fall 2005: Fan and Watnik, Fall 2006: Eudey and Kerr, and Fall 2007: Zhou). Although each of these faculty members brings much-needed knowledge and skills to the Department, it is unlikely that any of them would be prepared to assume the position of Chair in the near future. Thus, it would be highly advantageous to the Department to be approved to hire a senior (tenured) faculty member with the intent that he/she be groomed to serve as the next Chair.
e. Can you collaborate with another department on advertising or other costs of recruitment?

It is not feasible for us to collaborate with another department on advertising. However, our advertising costs are minimal (refer to pages 8-9 above, “9. Recruitment”).
New Faculty Justification:  
Department of Statistics and Biostatistics (2014)

Justification:


Statistician/Big Data Analytics/Visualization

The position we seek to fill in the Department of Statistics and Biostatistics is one that will meet many needs. We are seeking a position within the department specializing in data analytics and visualization. The successful candidate will have broad expertise in data programming languages, data management, and data visualization. In addition to assisting with the expansion of courses offered within the Department of Statistics and Biostatistics, this individual will be asked to interface with the College of Business and Economics to supplement their curriculum.

As noted by our external reviewer (Dr. M. E. Bock, who was previously the President of the American Statistical Association, which is the largest professional organization for statisticians in the country) in our 2011 5-Year Review:

“East Bay is the only one of the California State Universities with a separate statistics or biostatistics department and, in spite of its relatively small faculty size, the department has the largest graduate program offerings in the College of Science as noted in the Self Study. It competes very successfully with other freestanding master’s programs throughout the United States…. The program is a unique asset of the College and the University and provides a special advantage to the students who receive its degrees. They find themselves in demand in the Bay Area and any place else where employers have serious data analysis needs.”

Dr. Bock’s first and foremost recommendation was to increase the Department’s faculty size. An increase in faculty would enable the Department to explore serious growth in big data analytics and data visualization, and to increase the number of service courses needed to support the quantitative thinking skills of the students in the University.

20. Helping the Department, College, and University with Strategic Goals.

The addition of a new faculty member to the Department of Statistics and Biostatistics will help the Department continue its growth in the areas we are currently offering through our MS Statistics program (currently with four options), our MS Biostatistics (a Professional Science Master’s [PSM] program), and our BS Statistics program. In addition, a new faculty member will allow us to branch into new areas of the application of statistics relevant to the local job market.

In the Department’s five-year review (2011-2), three of its strategic goals were:

• Developing new Options in MS Degree in Statistics (data analytics and data mining)
• Developing a BS Statistics Degree in Computation, Data Analytics, Visualization, and Data Mining
• Focusing our efforts to further support our service courses offered throughout the University (GE courses and developing new service courses to meet University needs)

Clearly, these goals will be more attainable with the position described.

With respect to the University’s Shared Strategic Commitments, we believe that this hire would directly address commitments 3 (“Serve students first, by expanding access and enhancing each student’s educational experience and prospects for success as a graduate and life-long learner”) and 8 (“Demonstrate our continuing record of leadership and innovation in higher education, focused on 21st century skills, including science, technology, engineering, and mathematics (STEM)

A new faculty hire will allow us to continue to develop our programs and attract new students to the College of Science. With this new person we will be able to further support the prerequisite Statistics courses for other majors in the College of Science (e.g., the Departments of Engineering, Mathematics, Biology, Psychology, Nursing, and Health Science).

A new faculty hire will fit in perfectly with the University’s plans to become a STEM-centered university. With the increasing collection of data in science and in the business world, and the needs of companies to employ skilled people who can work with and analyze the available data for decision making purposes, this potential hire would be invaluable in increasing the Department’s ability to meet changing demands over the next decade and well into the current century.


The position will allow us to enhance our curriculum for both the BS Statistics and MS Statistics programs. In addition, we believe that an additional tenure-track faculty member skilled in analytics and visualization will increase student demand for our degree, minor, and certificate programs.

Additionally, there are a large number of Statistics classes that have not been offered in recent years because of 1) a lack of expertise in these areas and 2) the strain resulting from the growth in SCUs in our Department. Concerning offering additional classes, our Department would gain tremendous benefit from the ability to again offer our upper-division GE courses. And we could address the statistics job-market demands by offering courses in computational statistics, analysis of large data sets, and data visualization.

In our recent 5-Year Review (2011) we were externally reviewed by Dr. M.E. Bock (Dr. Bock also participated as the external reviewer in our previous two 5-Year Reviews). Dr. Bock mentioned the need to increase the number of faculty (she recommended hiring 5 new tenure-track faculty) to support our “large high quality graduate program” and give us the ability to offer more service courses to support the needs of the University. Dr. Bock wrote: “Especially in biotech and data information areas, private industry is a competing employer that continues to demand statisticians with graduate degrees.”

22. Student Demand.
The demand for undergraduate classes in Statistics has increased as the number of incoming freshman has increased. Almost all of the Statistics service courses have 45 to 50 students enrolled, while these courses have an academic capacity of 35. As of Fall, 2013, the average class size for all lower division undergraduate courses was 43.8. Despite having only 14 declared BS Statistics students, our upper division average section size is 38. This shows the value of our service to other departments, as upper division STAT courses do not count towards our graduate degrees.

The steady growth in Statistics majors could be increased with additional tenured/tenure-track faculty. Dr. Bock (our external reviewer on the 5-Year Review) noted: “Even the currently offered service courses have unacceptably large class sizes that do not allow for much one-on-one interaction with the instructor.”

An additional new faculty member will enable us to carry forward the success of our MS programs. Our graduate programs have more than doubled in the last ten years but the number of tenured and tenure-track faculty has remained flat.

Our numbers of majors and FTES has remained relatively steady over the past 4 years. However, our percentage of FTES taught by lecturers has increased: 25.5% in 2009, 29% in 2010, 40.4% in 2011, 51.7% in 2012, and 57.4% in 2013 (see http://www.csueastbay.edu/ira/tables/AcademicProgramReview/APR%20Science%20template%20nolink.htm). Analogously, the ratio of lecturers to tenure-track FTEF has increased greatly during this stretch. Increasing our tenure-track ranks will better enable us to meet demand, especially for major courses at both the graduate and undergraduate levels, than our current, lecturer-heavy staffing. In the past 5 years, we only have had 1 core course per year for our bachelor’s program taught by a tenure-track/tenured faculty member.


Our Department has an exceptionally strong reputation within the region, state, country, and internationally.

We have made connections with many employers in industry. According to a study by Academic Advising and Career Education, the Department of Statistics and Biostatistics has a “100% success” level of graduate degree holders employed or continuing education to the doctorate. We believe that the new faculty member can help us extend this success down to the undergraduate level. We additionally note that there are only 2 standalone Statistics Departments in the CSU (with Cal Poly SLO being the other) and that we are believed to be the largest terminal master’s degree in Statistics program in the country.

Each year we have a considerable number of international students enrolled in our programs. This is something we have worked hard to increase further. We have made efforts to list our Department website on educational websites with links to MS-level programs throughout the United States. In the past, we have also devoted considerable faculty and staff time to working with our international MS applicants to ensure all who are qualified are admitted to our program.
Many of our faculty members have connections to other statisticians nationally and internationally. Our faculty continues to participate and present at national conferences.

With a new faculty member we fully expect to continue the presence of our faculty at conferences and other meetings, in order to continue to support the excellent reputation of our Department. Additionally, it is anticipated that the presence of a new faculty member will further enhance our Department’s reputation by enhancing the Department’s ability to remain competitive in training students to meet the ever-changing needs in the fields of Statistics and Biostatistics.

The quality reputation of our Department is underscored by the approval of our MS Biostatistics program as a PSM. The awarding of PSM status is a lengthy process, and the goal is achieved only after following specific guidelines and meeting stringent regulations. The bestowing of PSM status is significant on the following levels: 1) our program was the first to achieve this goal at CSUEB and 2) ours was the first Biostatistics program to achieve this goal within the CSU. It is an honor to be awarded PSM status.

24. Faculty Composition.

k. The number of faculty in your department who have left, retired, or are in the FERP program over the last five years; and the dates of those events (a retirement does not automatically justify a replacement).

Over the last five years, the Department of Statistics and Biostatistics has lost one full-time faculty member to resignation and two to retirement (both entered the FERP program), as follows.

- Dr. Jaimyoung (Jamie) Kwon: resigned effective September 2009.
- Dr. Bruce Trumbo retired at the end of Winter Quarter 2006 and entered FERP Fall 2006. His FERP agreement ended in June 2011.
- Dr. Julia Norton retired in September 2009 and entered FERP Fall 2009. Her FERP agreement will end in June 2014.

We have hired a new faculty member, Dr. Ayona Chatterjee, who begins in Fall, 2014.

l. Ratio tenured/tenure-track faculty to FTEF.

Ratio of total tenured/tenure-track (tt) faculty to total FTEF.

According to Institutional Research, 3.9/8.3 in Fall, 2013.

m. Why tenured/tenure-track (tt) faculty over a part-time instructor?

Full-time faculty are more invested in building the program, and can provide the continued support through the years to assessing and improving the curriculum, particularly with respect to the
baccalaureate program. In addition, full time faculty can build relationships with students over time and include students in research activities.

We almost never receive a query expressing interest in a temporary teaching position from people with degrees in Statistics or Biostatistics. The job market for people with advanced degrees in these fields is excellent in the Bay Area, and we cannot compete with the salaries offered to these people by the private sector. We even have a difficult time hiring our current graduates or current master’s students to work as graders for our faculty, because (with the exception of international students on visas) most of our students are employed full-time in the private sector.

n. The number of majors and ratio of majors to tt faculty.

In 2013,

We have 138 majors and 6 full-time and 1 half-time tenured/tenure-track faculty.

o. Department SFR compared to College SFR.

34.9 for the department. According to the aforementioned IR data set, the College appears to have an SFR around 24.

h. The need in the context of your five-year hiring plan. (Each Department must have a 5-year hiring plan in place before a new faculty request will be considered. The 5-year plan must emphasize which sub-disciplines within the department are designated as distinctive, and necessitate a T/TT faculty.)

In the Department’s five-year review, the Department set as its goal an undergraduate degree program in “Computation, Data Analytics, Visualization, and Data Mining” and a new option in “data analytics and data mining”. The external reviewer indicated that we would need 3 new hires to achieve that goal. We have successfully completed one hiring process and that individual starts this coming Fall. However, our FERP member will be fully retired then, netting us only 0.5. As compared to 5 years ago, the net will be a loss of 1 faculty member.

In order to implement these plans we will need to hire another faculty member with expertise in these areas. In our recent 5-Year Review, Dr. Bock recommends hiring five new faculty members to maintain the quality of the Department’s graduate programs, to grow into the “extremely promising” areas of computationally intensive statistics/biostatistics. A larger faculty will also enable the Department to offer more service courses to provide undergraduates with the quantitative reasoning needed in today’s marketplace.

25. Curriculum.

g. Percentage of teaching that satisfies GE requirements.
The Department of Statistics and Biostatistics offers two lower-division GE courses, Stat 1000 and Stat 2010. Six to eight sections of these courses are offered every quarter with enrollments well above the academic capacity of 35 (usually 45 or more students are enrolled per section). Over the last eight years (including the projected course offerings for 2012-13), we have been unable to offer Stat 3040, one of the primary Statistics courses used to meet upper-division GE requirements. Stat 3050, another primary Statistics course utilized by students to meet B6 GE requirements, is offered most quarters. We have been able to offer Stat 3510, which meets the D4 requirement and is an elective for our majors, annually. Stat 4000, which is a D4 course, has decreased to an every-other-year course offering.

Over the 2013-2014 academic year, the percentage of sections in GE courses is about 30%.

h. Will online teaching and/or teaching at another campus site (Oakland/Concord) be a requirement of this position?

We have offered some of our service courses at the Concord campus (usually these are taught by lecturers). Because of the demands on the current faculty, we have been collectively unable to develop online course offerings. However, we believe that adding an eighth tenure-track faculty member to the Department would open up the possibility of online.

i. Does the position represent a central component of a CSUEB student’s education?

Yes. Many undergraduate majors, both large and small, have a lower-division or upper-division Statistics requirement. Some majors require Statistics courses at both the lower-division and upper-division levels. In the College of Science, the following majors list Statistics courses as major requirements: Biology, Computer Science, Engineering, Nursing, and Psychology. Additionally, the Mathematics major (both undergraduate and graduate programs) also can include upper-division/graduate Statistics and Probability classes taught by Statistics faculty. (Statistics faculty write and grade the Probability portion of the Mathematics Comprehensive Examination.)

Outside the College of Science: 1) the College of Business and Economics has Statistics requirements in its undergraduate and graduate Business programs and 2) various other majors throughout campus utilize Statistics courses as major requirements (e.g., Sociology, Economics).

26. Scholarship/New Sources of Revenue

k. Potential for scholarly success.

Based on the accomplishments of our recent faculty hires, there is every reason to expect that a new hire will have great potential for scholarly success.

l. Potential for external/internal support for scholarship.

Based on the accomplishments of our recent faculty hires, there is every reason to expect that a new hire will have good potential for internal support.

m. Is a replacement critical to the scholarly/research/creative efforts of units both in- and outside of the department or college? Does the position have the support of other colleges?
Yes, the replacement is critical. In our recent 5-Year Review we were externally reviewed by Dr. M. E. Bock. Dr. Bock was also our external reviewer for the previous two 5-Year Reviews. First and foremost Dr. Bock recommended hiring tenure-track (senior) faculty to support our graduate programs and to increase the number of Statistics service courses needed by the University. Although we have had five relatively new hires, we have also had one resignation and three retirements. In June 2014 Dr. Julia Norton’s FERP appointment will end. Dr. Bock also noted that Statistics major student demands have more than doubled since the previous 5-Year Review.

n. What has the unit done to maximize its current resources (i.e., to help itself?) over the past five years?

The Department has maintained a nationally competitive master’s program with limited resources. In the past five years Statistics and Biostatistics has lost a senior faculty member (Trumbo), one junior faculty member (Kwon), and another senior faculty member is on FERP (Norton) to end in June 2014. Although the faculty size has decreased since 2007-8, the graduate programs have dramatically increased in size.

The Department support staff has been reduced and the faculty has assumed responsibility for undergraduate student assessment and graduate student administration.

The Department is reliant on lecturers to teach the undergraduate service courses so that our faculty can teach graduate and upper division courses. Recently we have implemented computer-graded homework in the large service courses. We expect that another tenure-track faculty member would enable the Department to have more tenure-line faculty participation in undergraduate major and service courses. In the five core required courses in the undergraduate major (3401, 3502, 3503, 4601, 3900, 4950), it is typically the case that only one of these courses has been taught by a tenure-track/tenured faculty member per year.

o. Has the Department raised funds effectively from external sources? Has it worked effectively with external agencies and constituencies?

Yes, for student scholarships and Department Trust and Leadership accounts. These are listed in the order they were endowed:

- Heebok Park Scholarship
- George J. Resnikoff Memorial Scholarship
- Statistics Department Scholarship
- Justin Randle Memorial Scholarship
- Bruce E. Trumbo Scholarship

27. Recruitment.

a. How will your department ensure that hiring is performed with the diversity goals of the University in mind?

1. Planned recruiting at conferences, meetings, etc.:
We hope to recruit for this position at the annual Joint Statistics Meetings (JMS). This event is sponsored jointly by the American Statistical Association (ASA), the Institute of Mathematical Statistics (IMS), the International Biometric Society, and the Statistical Society of Canada.

Advance approval of the position announcement, hopefully including the position number, will make it possible to distribute an estimated 300 copies of the "long" position announcement as follows: (i) on tables adjacent to the main registration area; (ii) at informational booths of consenting organizations, including IMS, ASA Women's Caucus, Chinese Statistical Association; (iii) at informal mixers and receptions for recent PhDs and current graduate students; (iv) at poster sessions presented by various CSUEB faculty and students; and (v) during personal conversations.

2. Advertisements in journals and newsletters:
   A. An announcement (approved "short" form) will be submitted for inclusion in the October, November, and December issues of *Amstat News* (published monthly by ASA) — recognized as the major place to post printed academic job announcements in statistics for the US (estimated cost for 2013 search: $330.00).
   B. An announcement (approved "short" form) will be placed in the October, November, and December issues of the *IMS Bulletin* (estimated cost for 2013 search: $140.00), and at no additional charge on the IMS jobs website (www.imstat.org/jobs).
   C. An announcement (approved “short” form) is planned for inclusion in the newsletter of the ASA Women's Caucus (estimated cost for 2013 search: less than $100.00).
   D. The Department will request that the job announcement be sent to the ASA’s Committee on Minorities in Statistics. It is unclear what the costs of such an announcement would be, but we estimate it to be similar to the cost for distribution to the Women’s Caucus newsletter.

3. Web advertising (no-cost postings):
   A. Announcements ("short" and "long") will be posted on our Departmental web site. Because of the course content our faculty members have included on this site, it is frequently visited by academic statisticians.
   B. An announcement (approved “short” form) will be submitted to the Florida State University statistics jobs website (www.stat.ufl.edu/vlib/jobs.html), a recognized center for such postings in statistics.
   C. An announcement (approved “short” form) will be submitted to the CSUEB Employment Development website.

4. Mailed announcements:
   A. Letters with announcements will be sent to an available list of departments with PhD programs in statistics/biostatistics/computational statistics (especially women and minority students).
   B. We will review the list of recipients of the CSU Forgivable Loan/Doctoral Incentive Program. Letters with announcements will be mailed to any/all individuals who appear to meet position requirements.

5. Personal contacts: Faculty members and alumni/ae will be encouraged to notify colleagues about this position.
f. Is there a pressing need for a senior hire (tenured), either to ensure excellence or fill a leadership role?

No.

g. Can you collaborate with another department on advertising or other costs of recruitment?

It is not feasible for us to collaborate with another department on advertising. However, our advertising costs are minimal (refer to pages 8-9 above, “9. Recruitment”).
New Faculty and Affinity Hire Justification  
For Faculty Who Will Start Fall 2016

Introduction

Due to a large number of retirements and other changes at the University, some departments will need to continue the process of hiring tenure-track faculty. While economic realities (and enrollment ceilings) will not permit as much hiring as we would like, we would like to begin thinking and hiring strategically for the decade(s) ahead. This means both disciplinary hires and affinity faculty hires (affinity groups).

Please remember that any faculty searches that were approved for 2014-15 and went unfilled, will continue to be approved searches into 2015-16 (i.e. it is not required to re-submit a new faculty justification). For new 2015-16 faculty searches (where the new faculty will start Fall 2016), please use the format below to make each request for a tenure-track hire. All disciplinary hires and affinity faculty hires will use the format in A. Faculty Hires ILO 6 below. Affinity hires will also need to complete the format in B. Affinity Hires.

We anticipate hiring 20-25 faculty in the regular search process and six-ten faculty as affinity hires (plus rollover positions).

Your request must go through the normal channels from Chair, to Dean, to Provost. Departments must have programs that are up to date on Annual Reports and 5-Year Reviews, and have evidence in their reports that assessment of learning is occurring, to be considered for faculty searches. The timeline for these requests will be:

January 23, 2015    Departments and/or Affinity Group submit tenure-track hire requests to Deans
February 6, 2015    Five-year hiring plan and faculty search requests due in Provost’s Office
February 9-23, 2015  Provost discusses tenure-track requests with the Academic Affairs Leadership Team
February 27, 2015    First release of authorized recruitments to the Colleges
A. Faculty Hires: ILO 6

Justification:

1. Is this faculty request part of an Affinity Hire? If so, then B. Affinity Hires needs to be completed by the Affinity Hire group.
   
   No.

2. Brief overview of the position.
   The position we seek to fill in the Department of Statistics and Biostatistics is one that will meet many needs. We are seeking a position within the department specializing in data science. The successful candidate will have broad expertise in data programming languages, data management, and data visualization. These data science topics are important to both the MS Statistics and MS Biostatistics programs, as well as to the BS Statistics program. The graduate programs, which were the highest ranked programs in the College during “Planning for Distinction”, both had curricular changes approved last year that would benefit from a data science specialist. The Department will propose later this year to change the name of the “Computational Statistics” option in the MS Statistics program to be a “Data Science” option and incorporate additional new data science courses to be required within the revised option.

3. How does this position help the department meet its strategic goals, those of the College, and those of the University?
   As noted by our external reviewer (Dr. M. E. Bock, who was previously the President of the American Statistical Association, which is the largest professional organization for statisticians in the country) in our 2011 5-Year Review:
   
   “East Bay is the only one of [two] California State Universities with a separate statistics or biostatistics department and, in spite of its relatively small faculty size, the department has the largest graduate program offerings in the College of Science as noted in the Self Study. It competes very successfully with other freestanding master’s programs throughout the United States…. The program is a unique asset of the College and the University and provides a special advantage to the students who receive its degrees. They find themselves in demand in the Bay Area and any place else where employers have serious data analysis needs.”

   Dr. Bock’s first and foremost recommendation was to increase the Department’s faculty size. An increase in faculty would enable the Department to explore serious growth in big data science, and to increase the number of service courses needed to support the quantitative thinking skills of the students in the University.

   In the Department’s five-year review (2011-2), three of its strategic goals were:
     • Developing new Options in MS Degree in Statistics (data science and data mining)
     • Developing a BS Statistics Degree in Computation, Data science, Visualization, and Data Mining
     • Focusing our efforts to further support our service courses offered throughout the University (GE courses and developing new service courses to meet University needs)
   Clearly, these goals will be more attainable with the position described.

   With respect to the University’s Shared Strategic Commitments, we believe that this hire would directly address commitments 3 ("Serve students first, by expanding access and enhancing each"
student’s educational experience and prospects for success as a graduate and life-long learner”) and 8 (“Demonstrate our continuing record of leadership and innovation in higher education, focused on 21st century skills, including science, technology, engineering, and mathematics (STEM)”).

A new faculty hire will allow us to continue to develop our programs and attract new students to the College of Science. With this new person we will be able to further support the prerequisite Statistics courses for other majors in the College of Science (e.g., the Departments of Engineering, Mathematics, Biology, Psychology, Nursing, and Health Science).

A new faculty hire will fit in perfectly with the University’s plans to become a STEM-centered university. With the increasing collection of data in science and in the business world, and the needs of companies to employ skilled people who can work with and analyze the available data for decision making purposes, this potential hire would be invaluable in increasing the Department’s ability to meet changing demands over the next decade and well into the current century. Indicative of this, the MS Statistics and MS Biostatistics were the top two degree programs in the College of Science, with both receiving “commend” from the Planning for Distinction process.

4. What are the three most pressing needs to be filled by this position? Curricular gaps? Student Demand? Accreditation requirements? Other?

The position will allow us to enhance our curriculum for both the BS Statistics and MS Statistics programs. In addition, we believe that an additional tenure-track faculty member skilled in data science will increase student demand for our degree, minor, and certificate programs.

Additionally, there are a large number of Statistics classes that have not been offered in recent years because of 1) a lack of expertise in these areas and 2) the strain resulting from the growth in SCUs in our Department. Concerning offering additional classes, our Department would gain tremendous benefit from the ability to again offer our upper-division GE courses. And we could address the statistics job-market demands by offering courses in the revitalized and renamed data science option.

In our recent 5-Year Review (2011) we were externally reviewed by Dr. M.E. Bock (Dr. Bock also participated as the external reviewer in our previous two 5-Year Reviews). Dr. Bock mentioned the need to increase the number of faculty (she recommended hiring 5 new tenure-track faculty) to support our “large high quality graduate program” and give us the ability to offer more service courses to support the needs of the University. Dr. Bock wrote: “Especially in biotech and data information areas, private industry is a competing employer that continues to demand statisticians with graduate degrees.”

5. If student demand is a key driver of this position, please analyze student demand over the past 5 years and how this position will help meet that need. Additionally, please describe how this position will impact the availability of part-time funds? Can the department afford a full-time hire, while maintaining a sufficient number of part-time lecturers to meet demand?

The demand for undergraduate classes in Statistics has increased as the number of incoming freshman has increased. Almost all of the Statistics service courses have 45 to 50 students enrolled, while these courses have an academic capacity of 35. As of Fall, 2013, the average class size for all lower division undergraduate courses was 43.8. Despite having only 14 declared BS Statistics
students, our upper division average section size is 38. This shows the value of our service to other departments, as upper division STAT courses do not count towards our graduate degrees.

The steady growth in Statistics majors could be increased with additional tenured/tenure-track faculty. Dr. Bock (our external reviewer on the 5-Year Review) noted: “Even the currently offered service courses have unacceptably large class sizes that do not allow for much one-on-one interaction with the instructor.”

An additional new faculty member will enable us to carry forward the success of our MS programs. Our graduate programs have more than doubled in the last ten years but the number of tenured and tenure-track faculty has remained flat.

Our numbers of majors and FTES has remained relatively steady over the past 4 years. However, our percentage of FTES taught by lecturers has increased: 25.5% in 2009, 29% in 2010, 40.4% in 2011, 51.7% in 2012, and 57.4% in 2013 (see http://www20.csueastbay.edu/ir/files/pdf/academic-program-review/summary-2009-13/APR-Summary-Data-CS-Fall-2009-13.pdf). Analogously, the ratio of lecturers to tenure-track FTEF has increased greatly during this stretch. Increasing our tenure-track ranks will better enable us to meet demand, especially for major courses at both the graduate and undergraduate levels, than our current, lecturer-heavy staffing. In the past 5 years, we only have had 1 core course per year for our bachelor’s program taught by a tenure-track/tenured faculty member.

6. Does the department/school have a strong reputation and can it be made one of the strongest in the region/country by the addition/replacement of one or more faculty members?
Our Department has an exceptionally strong reputation within the region, state, country, and internationally.

We have made connections with many employers in industry. According to a study by Academic Advising and Career Education, the Department of Statistics and Biostatistics has a “100% success” level of graduate degree holders employed or continuing education to the doctorate. We believe that the new faculty member can help us extend this success down to the undergraduate level. We additionally note that there are only 2 standalone Statistics Departments in the CSU (with Cal Poly SLO being the other) and that we are believed to be the largest terminal master’s degree in Statistics program in the country.

Each year we have a considerable number of international students enrolled in our programs. This is something we have worked hard to increase further. We have made efforts to list our Department website on educational websites with links to MS-level programs throughout the United States. In the past, we have also devoted considerable faculty and staff time to working with our international MS applicants to ensure all who are qualified are admitted to our program.

Many of our faculty members have connections to other statisticians nationally and internationally. Our faculty continues to participate and present at national conferences.

With a new faculty member we fully expect to continue the presence of our faculty at conferences and other meetings, in order to continue to support the excellent reputation of our Department. Additionally, it is anticipated that the presence of a new faculty member will further enhance our
Department’s reputation by enhancing the Department’s ability to remain competitive in training students to meet the ever-changing needs in the fields of Statistics and Biostatistics.

The quality reputation of our Department is underscored by the approval of our MS Biostatistics program as a PSM. The awarding of PSM status is a lengthy process, and the goal is achieved only after following specific guidelines and meeting stringent regulations. The bestowing of PSM status is significant on the following levels: 1) our program was the first to achieve this goal at CSUEB and 2) ours was the first Biostatistics program to achieve this goal within the CSU. It is an honor to be awarded PSM status.

Please describe briefly;

7. Faculty Composition.
   a. The number of faculty in your department who have left, retired, or are in the FERP program over the last five years; and the dates of those events (a retirement does not automatically justify a replacement.)
      Over the last five years, the Department of Statistics and Biostatistics has lost one full-time faculty member to resignation and two to retirement (both entered the FERP program), as follows.

      - Dr. Jaimyoung (Jamie) Kwon: resigned effective September 2009.
      - Dr. Bruce Trumbo retired at the end of Winter Quarter 2006 and entered FERP Fall 2006. His FERP agreement ended in June 2011.
      - Dr. Julia Norton retired in September 2009 and entered FERP Fall 2009. Her FERP agreement ended in June 2014.

   b. The ratio of tenured/tenure-track faculty to total FTEF in your department

   c. Why a tenured/tenure-track faculty position is needed over a full or part-time instructor.
      Full-time faculty are more invested in building the program, and can provide the continued support through the years to assessing and improving the curriculum, particularly with respect to the baccalaureate program. In addition, full time faculty can build relationships with students over time and include students in research activities.

      We almost never receive a query expressing interest in a temporary teaching position from people with degrees in Statistics or Biostatistics. The job market for people with advanced degrees in these fields is excellent in the Bay Area, and we cannot compete with the salaries offered to these people by the private sector. We even have a difficult time hiring our current graduates or current master’s students to work as graders for our faculty, because (with the exception of international students on visas) most of our students are employed full-time in the private sector.

   d. The number of majors and the ratio of majors to tenured/tenure-track faculty in your department.
In 2013, we have 138 majors and 6 full-time and 1 half-time tenured/tenure-track faculty.

e. Department/School SFR as compared to the College SFR.
   34.9 for the department. According to the aforementioned IR data set, the College appears to have an SFR around 28.

f. The need in the context of your five-year hiring plan. (Each Department must have a 5-year hiring plan in place before a new faculty request will be considered. The 5-year plan must emphasize which sub-disciplines within the department are designated as distinctive, and necessitate a T/TT faculty).
In the Department’s five-year review, the Department set as its goal an undergraduate degree program in “Computation, Data science, Visualization, and Data Mining” and a new option in “data science”. The external reviewer indicated that we would need 3 new hires to achieve that goal. We have successfully completed one hiring process and that individual started this Fall. However, our FERP member has now fully retired then, netting us only 0.5. As compared to 5 years ago, the net will be a loss of 1 faculty member.

In order to implement these plans we will need to hire another faculty member with expertise in these areas. In our recent 5-Year Review, Dr. Bock recommends hiring five new faculty members to maintain the quality of the Department’s graduate programs, to grow into the “extremely promising” areas of computationally intensive statistics/biostatistics. A larger faculty will also enable the Department to offer more service courses to provide undergraduates with the quantitative reasoning needed in today’s marketplace.

8. Curriculum
   a. The percentage of teaching in your department which satisfies general education requirements
The Department of Statistics and Biostatistics offers two lower-division GE courses, Stat 1000 and Stat 2010. Six to eight sections of these courses are offered every quarter with enrollments well above the academic capacity of 35 (usually 45 or more students are enrolled per section). Over the last five years, we have been unable to offer Stat 3040 (causing it to be lost from the Catalog), one of the primary Statistics courses used to meet upper-division GE requirements. Stat 3050, another primary Statistics course utilized by students to meet B6 GE requirements, is offered most quarters. We have been able to offer Stat 3510, which meets the D4 requirement and is an elective for our majors, annually. Stat 4000, which is a D4 course, has decreased to an every-other-year course offering.

Over the 2014-2015 academic year, the percentage of sections in GE courses is about 30%.
   b. Will online teaching and/or teaching at another campus site (i.e. Oakland/Concord) be a requirement of this position?
We have offered some of our service courses at the Concord campus (usually these are taught by lecturers). Because of the demands on the current faculty, we have been collectively unable to develop online course offerings. However, we believe that adding an eighth tenure-track faculty member to the Department would open up the possibility of online.
c. Does the position represent a central component of a CSU, East Bay’s student’s education? How?
Yes. Many undergraduate majors, both large and small, have a lower-division or upper-division Statistics requirement. Some majors require Statistics courses at both the lower-division and upper-division levels. In the College of Science, the following majors list Statistics courses as major requirements: Biology, Computer Science, Engineering, Nursing, and Psychology. Additionally, the Mathematics major (both undergraduate and graduate programs) also can include upper-division/graduate Statistics and Probability classes taught by Statistics faculty. (Statistics faculty write and grade the Probability portion of the Mathematics Comprehensive Examination.)

Outside the College of Science: 1) the College of Business and Economics has Statistics requirements in its undergraduate and graduate Business programs and 2) various other majors throughout campus utilize Statistics courses as major requirements (e.g., Sociology, Economics).

d. Briefly describe the process of assessment in the department and this position’s role in that process.
The faculty has resolved to perform assessment in the graduate and undergraduate regression courses for the MS and BS Statistics programs, respectively, and the clinical trials course for the MS Biostatistics program. In addition, the master’s programs will have some assessment done as part of the comprehensive examination. All tenure-track and tenured faculty participate in all aspects of the comprehensive examination already. In addition, the Department considers program assessment to be the responsibility of the entire faculty. That is to say, all faculty members, including new ones, participate in our program assessment.

9. Scholarship/New Sources of Revenue
   a. Address the potential for scholarly success.
      Based on the accomplishments of our recent faculty hires, there is every reason to expect that a new hire will have great potential for scholarly success.

   b. Address the potential for external/internal support for scholarship.
      Based on the accomplishments of our recent faculty hires, there is every reason to expect that a new hire will have good potential for internal support.

   c. Is a replacement critical to the scholarly/research/creative efforts of units both in- and outside of the department or college? Does the position have the support of other colleges?
      Yes, the replacement is critical. In our recent 5-Year Review we were externally reviewed by Dr. M. E. Bock. Dr. Bock was also our external reviewer for the previous two 5-Year Reviews. First and foremost Dr. Bock recommended hiring tenure-track (senior) faculty to support our graduate programs and to increase the number of Statistics service courses needed by the University. We have had one new hire (beginning Fall, 2014), but we have also had one resignation and two retirements. Dr.
Julia Norton’s FERP appointment ended last year. Dr. Bock also noted that Statistics major student demands have more than doubled since the previous 5-Year Review.

d. What has the unit done to maximize its current resources (i.e., to help itself?) over the past five years?
The Department has maintained a nationally competitive master’s program with limited resources. In the past five years, Statistics and Biostatistics has lost two senior faculty members (Norton and Trumbo) and one junior faculty member (Kwon), while only having one new tenure-track hire (Chatterjee). Although the faculty size has decreased since 2008-9, the graduate programs have dramatically increased in size.

The Department support staff has been reduced and the faculty has assumed responsibility for undergraduate student assessment and graduate student administration.

The Department is reliant on lecturers to teach the undergraduate service courses so that our faculty can teach graduate and upper division courses. Recently we have implemented computer-graded homework in the large service courses. We expect that another tenure-track faculty member would enable the Department to have more tenure-line faculty participation in undergraduate major and service courses. In the five core required courses in the undergraduate major (3401, 3502, 3503, 4601, 3900/4950), it is typically the case that only one of these courses has been taught by a tenure-track/tenured faculty member per year.

e. Has the department raised funds effectively from external sources? Has it worked effectively with external agencies and constituencies?

Yes, for student scholarships and Department Trust and Leadership accounts. These are listed in the order they were endowed:

Heebok Park Scholarship
George J. Resnikoff Memorial Scholarship
Statistics Department Scholarship
Justin Randle Memorial Scholarship
Bruce E. Trumbo Scholarship

10. Recruitment:

a. How will your department ensure that hiring is performed with the diversity goals of the University in mind?

We hope to recruit for this position at the annual Joint Statistics Meetings (JMS). This event is sponsored jointly by the American Statistical Association (ASA), the Institute of Mathematical Statistics (IMS), the International Biometric Society, and the Statistical Society of Canada.

Advance approval of the position announcement, hopefully including the position number, will make it possible to distribute an estimated 300 copies of the "long" position announcement as follows: (i) on tables adjacent to the main registration area; (ii) at
informational booths of consenting organizations, including IMS, ASA Women's Caucus, Chinese Statistical Association; (iii) at informal mixers and receptions for recent PhDs and current graduate students; (iv) at poster sessions presented by various CSUEB faculty and students; and (v) during personal conversations.

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C. An announcement (approved "short" form) is planned for inclusion in the newsletter of the ASA Women's Caucus (estimated cost for 2013 search: less than $100.00).
D. The Department will request that the job announcement be sent to the ASA’s Committee on Minorities in Statistics. It is unclear what the costs of such an announcement would be, but we estimate it to be similar to the cost for distribution to the Women’s Caucus newsletter.

3. Web advertising (no-cost postings):
A. Announcements ("short" and "long") will be posted on our Departmental web site. Because of the course content our faculty members have included on this site, it is frequently visited by academic statisticians.
B. An announcement (approved "short" form) will be submitted to the Florida State University statistics jobs website (www.stat.ufl.edu/vlib/jobs.html), a recognized center for such postings in statistics.
C. An announcement (approved "short" form) will be submitted to the CSUEB Employment Development website.

4. Mailed announcements:
A. Letters with announcements will be sent to an available list of departments with PhD programs in statistics/biostatistics/computational statistics (especially women and minority students).
B. We will review the list of recipients of the CSU Forgivable Loan/Doctoral Incentive Program. Letters with announcements will be mailed to any/all individuals who appear to meet position requirements.

5. Personal contacts: Faculty members and alumni/ae will be encouraged to notify colleagues about this position.

b. Is there a pressing need for a senior hire (tenured), either to ensure excellence or fill a leadership role?
   
   No.

c. Can you collaborate with another department on advertising or other costs of recruitment?
It is not feasible for us to collaborate with another department on advertising. However, our advertising costs are minimal (refer to pages 8-9 above, “9. Recruitment”).

B. Affinity Hires

1. New Affinity Hires in Community Engagement (ILO 1 and 4)

We can all agree that the “Institutional Learning Outcomes” (ILO) should drive our hires. It is clear that over the past three years, our searches have mainly concentrated on ILO 6, “demonstrate expertise and integration of ideas, methods, theory and practice in a specialized discipline of study”. The other five ILOs have been minimally addressed unless they were connected to a specific discipline. Many faculty requests have merit beyond ILO 6, and would be considered if they have a stronger connection to the other ILOs. Therefore, the Provost will accept proposals for ILO affinity faculty hires for Fall 2016 searches.

Affinity Groups around ILOs will help students achieve the learning, knowledge, creativity and thinking skills that we require of our graduates and will assist the University in assessing student learning in these areas. Affinity Groups will consist of at least three faculty positions from at least two colleges. This year, we will support two Affinity Groups representing three of the ILOs (3, 4, and 5). One of the Affinity Groups will be an expansion of the existing Affinity Group “Teaching Sustainability in Diversity” (ILO 3 and 5). The other Affinity Group will be new and will be based on Community Engagement (ILO 4).

Each faculty request that comprises a new Affinity Group or is being requested to be added to an existing Affinity Group will need to have completed the faculty requests information in part A. Faculty Hires ILO 6 above. There are separate Affinity Group applications, one for the new Affinity Group, and one for additions to the existing Affinity Group.


The application should consist of:

   a. A brief vision statement of how the affinity group will assist the institution in advancing and assessing the ILO.

   b. A list of which faculty requests will be used to form the affinity group.

   c. A description of how the affinity group will advance the university’s strengths and distinctiveness, in terms of scholarly activities, service to the community, assessment and/or innovative curriculum (Use Section 1 and 2 of your faculty requests as your guide, with modification on how the faculty position supports the Affinity Group).

   d. A description of how the Affinity Group will work together, both curricular and scholarly, to advance and assess the ILO.

   e. A description of existing faculty* that will be part of the Affinity group and what their role will be.
3. Expansion of Existing Affinity Group “Teaching Sustainability in Diversity” (ILO 3 and 5).

   a. A brief vision statement of how these additions to the Affinity Group will expand the group’s ability to assist the institution in advancing and assessing the ILO.

   b. A list of which faculty requests will be used to add to the existing Affinity Group.

   c. A description of how these additions to the Affinity Group will further advance the university’s strengths and distinctiveness (beyond what the current Affinity Group can accomplish), in terms of scholarly activities, service to the community, assessment and/or innovative curriculum (Use Section 1 and 2 of your faculty requests as your guide, with modification on how the faculty position supports the Affinity Group).

   d. A description of how the expanded Affinity Group will work together, both curricular and scholarly, to advance and assess the ILO.

   e. A description of existing faculty* that will be part of the Affinity Group and what their role will be.

*Note: Up to three existing faculty mentors per Affinity group will be given one course release time to help organize and mentor the Affinity Group.
New Faculty Justification  
For Faculty Who Will Start Fall 2017

Introduction

Due to a large number of retirements and other changes at the University, some departments will need to continue the process of hiring tenure-track faculty. While economic realities (and enrollment ceilings) will not permit as much hiring as we would like, we would like to begin thinking and hiring strategically for the decade(s) ahead.

Please remember that any faculty searches that were approved for 2015-16 and went unfilled, can continue to be approved searches. Please let me know if you wish to continue these searches. For new 2016-17 faculty searches (where the new faculty will start Fall 2017), please use the format below to make each request for a tenure-track hire.

Your request must go through the normal channels from Chair, to Dean, to Provost. The timeline for these requests will be:

- December 16, 2015: Departments/Library submit tenure-track hire requests to Deans
- January 20, 2016: Five-year hiring plan and faculty search requests due in Provost’s Office
- January 27 - Feb. 18, 2016: Provost discusses tenure-track requests with the Deans
- February 18, 2016: First release of authorized recruitments to the Colleges/Library

Justification:


Statistician/Data Scientist/Visualization

The position we seek to fill in the Department of Statistics and Biostatistics is one that will meet many needs. We are seeking a position within the department specializing in data science and visualization. The successful candidate will have broad expertise in data programming languages, statistical algorithms, and data visualization.

As noted by our external reviewer (Dr. M. E. Bock, who was previously the President of the American Statistical Association, which is the largest professional organization for statisticians in the country) in our 2011 5-Year Review:

“East Bay is the only one of the California State Universities with a separate statistics or biostatistics department and, in spite of its relatively small faculty size, the department has the largest graduate program offerings in the College of Science as noted in the Self Study. It competes very successfully with other freestanding master’s programs throughout the United States…. The program is a unique asset of the College and the University and provides a special advantage to the
students who receive its degrees. They find themselves in demand in the Bay Area and any place else where employers have serious data analysis needs.”

Dr. Bock’s first and foremost recommendation was to increase the Department’s faculty size. An increase in faculty would enable the Department to explore serious growth in data science and visualization, and to increase the number of service courses needed to support the quantitative thinking skills of the students in the University.

12. How does this position help the department meet its strategic goals, those of the College, and those of the University?

The addition of a new faculty member to the Department of Statistics and Biostatistics will help the Department continue its growth in the areas we are currently offering through our MS Statistics program (currently with four options), our MS Biostatistics (a Professional Science Master’s [PSM] program), and our BS Statistics program. In addition, a new faculty member will allow us to branch into new areas of the application of statistics relevant to the local job market.

In the Department’s five-year review (2011-2), three of its strategic goals were:
• Developing new Options in MS Degree in Statistics (data analytics and data mining)
• Developing a BS Statistics Degree in Computation, Data Analytics, Visualization, and Data Mining
• Focusing our efforts to further support our service courses offered throughout the University (GE courses and developing new service courses to meet University needs)

Clearly, these goals will be more attainable with the position described. The Department, in its semester transformation plan, indicated that it was changing its “Computational Statistics” Option to its MS Statistics degree to be a concentration in “Data Science”. It has applied for the course prefix “DATA” to indicate this. We are likely to propose a specific “Data Science” area of emphasis, which would rely more on computer science than math, within the BS Statistics program.

With respect to the University’s Shared Strategic Commitments, we believe that this hire would directly address commitments 3 (“Serve students first, by expanding access and enhancing each student’s educational experience and prospects for success as a graduate and life-long learner”) and 8 (“Demonstrate our continuing record of leadership and innovation in higher education, focused on 21st century skills, including science, technology, engineering, and mathematics (STEM)”).

A new faculty hire will allow us to continue to develop our programs and attract new students to the College of Science. With this new person we will be able to further support the prerequisite Statistics courses for other majors in the College of Science (e.g., the Departments of Engineering, Mathematics, Biology, Psychology, Nursing, and Health Science). This year, the Department has offered an additional section of STAT 3031 (a service course mainly for Biology) in both the Fall and Winter Quarters and there is still a wait-list for the course near 20 in the Winter Quarter. In addition, the Department has a long wait list for STAT 3010 (a service course mainly for Psychology).

A new faculty hire will fit in perfectly with the University’s plans to become a STEM-centered university. With the increasing collection of data in science and in the business world, and the needs of companies to employ skilled people who can work with and analyze the available data for decision
making purposes, this potential hire would be invaluable in increasing the Department’s ability to meet changing demands over the next decade and well into the current century.

13. What are the three most pressing needs to be filled by this position? Curricular gaps? Student Demand? Accreditation requirements? Other?

The position will allow us to enhance our curriculum for both the BS Statistics and MS Statistics programs. In addition, we believe that an additional tenure-track faculty member skilled in data science and visualization will increase student demand for our degree, minor, and certificate programs.

Additionally, there are a large number of Statistics classes that have not been offered in recent years because of 1) a lack of expertise in these areas and 2) the strain resulting from the growth in SCUs in our Department. We could address the statistics job-market demands by offering courses in computational statistics, analysis of large data sets, and data visualization.

In our recent 5-Year Review (2011) we were externally reviewed by Dr. M.E. Bock (Dr. Bock also participated as the external reviewer in our previous two 5-Year Reviews). Dr. Bock mentioned the need to increase the number of faculty (she recommended hiring 5 new tenure-track faculty) to support our “large high quality graduate program” and give us the ability to offer more service courses to support the needs of the University. Dr. Bock wrote: “Especially in biotech and data information areas, private industry is a competing employer that continues to demand statisticians with graduate degrees.”

14. If student demand is a key driver of this position, please analyze student demand over the past 5 years and how this position will help meet that need. Additionally, please describe how this position will impact the availability of part-time funds? Can the department afford a full-time hire, while maintaining a sufficient number of part-time lecturers to meet demand?

The demand for undergraduate classes in Statistics has increased as the number of incoming freshman has increased. Almost all of the Statistics service courses have 45 to 50 students enrolled, while these courses have an academic capacity of 35. As of Fall, 2015, the average class size for all lower division undergraduate courses was 49. Despite having only 28 declared BS Statistics students, for courses not tiered with graduate-level sections, our upper division average section size is 42.3. This shows the value of our service to other departments, as upper division STAT courses do not count towards our graduate degrees.

The steady growth in Statistics majors could be increased with additional tenured/tenure-track faculty. Dr. Bock (our external reviewer on the 5-Year Review) noted: “Even the currently offered service courses have unacceptably large class sizes that do not allow for much one-on-one interaction with the instructor.”

An additional new faculty member will enable us to carry forward the success of our MS programs. Our graduate programs have more than doubled in the last ten years but the number of tenured and tenure-track faculty has remained flat.

Our numbers of majors and FTES has remained relatively steady over the past 4 years. However, our percentage of FTES taught by lecturers has increased: 29% in 2010, 40.4% in 2011, 51.7% in 2012, 57.4% in 2013, and 49.2% in 2014 (see http://www20.csueastbay.edu/ir/files/html/apr/apr%20sfr%20by%20department.html ).
Analogously, the ratio of lecturers to tenure-track FTEF has increased greatly during this stretch. Increasing our tenure-track ranks will better enable us to meet demand, especially for major courses at both the graduate and undergraduate levels, than our current, lecturer-heavy staffing. We only have had 1 core course per year for our bachelor’s program taught by a tenure-track/tenured faculty member for numerous years up until last year, when we were able to increase it to 2.

Increasing the ranks of our tenure-track faculty will not negatively impact our entitled lecturers. It might lower our need for hiring temporary lecturers. We note that, of our 4 entitled lecturers currently, only 1 has a doctorate in Statistics. Many of our temporary lecturers don’t have doctorates and some don’t even have a Master’s in Statistics.

15. Does the department/school have a strong reputation and can it be made one of the strongest in the region/country by the addition/replacement of one or more faculty members?

Our Department has an exceptionally strong reputation within the region, state, country, and internationally.

We have made connections with many employers in industry. According to a study by Academic Advising and Career Education, the Department of Statistics and Biostatistics has a “100% success” level of graduate degree holders employed or continuing education to the doctorate. We believe that the new faculty member can help us extend this success down to the undergraduate level. We additionally note that there are only 2 standalone Statistics Departments in the CSU (with Cal Poly SLO being the other) and that we are believed to be the largest terminal master’s degree in Statistics program in the country.

Each year we have a considerable number of international students enrolled in our programs. This is something we have worked hard to increase further. We have made efforts to list our Department website on educational websites with links to MS-level programs throughout the United States. In the past, we have also devoted considerable faculty and staff time to working with our international MS applicants to ensure all who are qualified are admitted to our program.

Many of our faculty members have connections to other statisticians nationally and internationally. Our faculty continues to participate and present at national conferences.

With a new faculty member, we fully expect to continue the presence of our faculty at conferences and other meetings, in order to continue to support the excellent reputation of our Department. Additionally, it is anticipated that the presence of a new faculty member will further enhance our Department’s reputation by enhancing the Department’s ability to remain competitive in training students to meet the ever-changing needs in the fields of Statistics and Biostatistics.

The quality reputation of our Department is underscored by the approval of our MS Biostatistics program as a PSM. The awarding of PSM status is a lengthy process, and the goal is achieved only after following specific guidelines and meeting stringent regulations. The bestowing of PSM status is significant on the following levels: 1) our program was the first to achieve this goal at CSUEB and 2) ours was the first Biostatistics program to achieve this goal within the CSU. It is an honor to be awarded PSM status.
Please describe briefly;

16. Faculty Composition.
   a. The number of faculty in your department who have left, retired, or are in the FERP program over the last five years; and the dates of those events (a retirement does not automatically justify a replacement.)

   Over the last five years, the Department of Statistics and Biostatistics has lost one full-time faculty member to resignation and two to retirement (both entered the FERP program), as follows.

   - Dr. Bruce Trumbo retired at the end of Winter Quarter 2006 and entered FERP Fall 2006. His FERP agreement ended in June 2011.
   - Dr. Julia Norton retired in September 2009 and entered FERP Fall 2009. Her FERP agreement will end in June 2014.

   We hired a new faculty member, Dr. Ayona Chatterjee, who began in Fall, 2014. We have a search for a new hire. If successful, that person will begin in Fall, 2016.

   b. The ratio of tenured/tenure-track faculty to total FTEF in your department

   According to Institutional Research, 3.9/8.3 in Fall, 2013.

   c. Why a tenured/tenure-track faculty position is needed over a full or part-time instructor.

   Full-time faculty are more invested in building the program, and can provide the continued support through the years to assessing and improving the curriculum, particularly with respect to the baccalaureate program. In addition, full time faculty can build relationships with students over time and include students in research activities.

   We almost never receive a query expressing interest in a temporary teaching position from people with degrees in Statistics or Biostatistics. The job market for people with advanced degrees in these fields is excellent in the Bay Area, and we cannot compete with the salaries offered to these people by the private sector. We even have a difficult time hiring our current graduates or current master’s students to work as graders for our faculty, because (with the exception of international students on visas) most of our students are employed full-time in the private sector.

   d. The number of majors and the ratio of majors to tenured/tenure-track faculty in your department.

   We have 164 graduate majors and 28 undergraduate majors, with 7 TTF.

   e. Department/School SFR as compared to the College SFR.

   33.2 for the department. Science’s SFR in 2014 was 27.2.

   f. The need in the context of your five-year hiring plan. (Each Department must have a 5-year hiring plan in place before a new faculty request will be considered. The 5-year
plan must emphasize which sub-disciplines within the department are designated as distinctive, and necessitate a T/TT faculty).

In the Department’s five-year review, the Department set as its goal an undergraduate degree program in “Computation, Data Analytics, Visualization, and Data Mining” and a new option in “data analytics and data mining”. The external reviewer indicated that we would need 3 new hires to achieve that goal. We have successfully completed one hiring process and that individual started in Fall, 2014. However, our FERP member retired then, netting us only 0.5. As compared to 5 years ago, we have not changed.

In order to implement these plans we will need to hire another faculty member with expertise in these areas. In our recent 5-Year Review, Dr. Bock recommends hiring five new faculty members to maintain the quality of the Department’s graduate programs, to grow into the “extremely promising” areas of computationally intensive statistics/biostatistics, which is now commonly referred to as “data science”. A larger faculty will also enable the Department to offer more service courses to provide undergraduates with the quantitative reasoning needed in today’s marketplace.

17. Curriculum
   a. The percentage of teaching in your department which satisfies general education requirements
   The Department of Statistics and Biostatistics offers two lower-division GE courses, Stat 1000 and Stat 2010. Six to eight sections of these courses are offered every quarter with enrollments well above the academic capacity of 35 (usually 45 or more students are enrolled per section). Over the last five years (as well as this year), we have been unable to offer Stat 3040, one of the primary Statistics courses used to meet upper-division GE requirements. Stat 3050, another primary Statistics course utilized by students to meet B6 GE requirements, is offered most quarters, but will not be offered this Spring. We have been able to offer Stat 3510, which meets the D4 requirement and is an elective for our majors, annually in the Fall. Stat 4000, which is a D4 course, has decreased to an every-other-year (Spring) course offering.

   Over the 2015-2016 academic year, the percentage of sections in GE courses is about 33%.

   b. Will online teaching and/or teaching at another campus site (i.e. Oakland/Concord) be a requirement of this position?

   We have offered some of our service courses at the Concord campus (usually these are taught by lecturers). Because of the demands on the current faculty, we have been collectively unable to develop online course offerings. However, we believe that adding another tenure-track faculty member to the Department would open up the possibility of online.

   c. Does the position represent a central component of a CSU, East Bay’s student’s education? How?

   Yes. Many undergraduate majors, both large and small, have a lower-division or upper-division Statistics requirement. Some majors require Statistics courses at both the lower-division and upper-division levels. In the College of Science, the following majors list Statistics courses as major requirements: Biology, Computer Science, Engineering, Nursing, and Psychology. Additionally, the Mathematics major (both undergraduate and graduate programs) also can
include upper-division/graduate Statistics and Probability classes taught by Statistics faculty. (Statistics faculty write and grade the Probability portion of the Mathematics Comprehensive Examination.)

Outside the College of Science: 1) the College of Business and Economics has Statistics requirements in its undergraduate and graduate Business programs and 2) various other majors throughout campus utilize Statistics courses as major requirements (e.g., Sociology, Economics).

18. Scholarship/New Sources of Revenue
   a. Address the potential for scholarly success.
      Based on the accomplishments of our recent faculty hires, there is every reason to expect that a new hire will have great potential for scholarly success.

   b. Address the potential for external/internal support for scholarship.
      Based on the accomplishments of our recent faculty hires, there is every reason to expect that a new hire will have good potential for internal support.

   c. Is a replacement critical to the scholarly/research/creative efforts of units both in- and outside of the department or college? Does the position have the support of other colleges?
      For the past 3 years, we have had a faculty member receive reassigned time (often 4 WTU/quarter) from the Office of Research and Sponsored Programs. This faculty member serves as an internal consultant, assisting faculty members, students, and others at the University with their research projects. In addition, we had to increase the number of sections of service courses (especially STAT 3010 and 3031) in recent years. So, while we have not explicitly asked other colleges, we believe that the position is critical and benefits other departments within the College, as well as other departments and faculty members across the University, as it allows the Department to offer the increasingly-needed service courses and allow the faculty member to consult.

      In our most recent 5-Year Review, we were externally reviewed by Dr. M. E. Bock. Dr. Bock was also our external reviewer for the previous two 5-Year Reviews. First and foremost Dr. Bock recommended hiring tenure-track (senior) faculty to support our graduate programs and to increase the number of Statistics service courses needed by the University. Dr. Bock also noted that Statistics major student demands have more than doubled since the previous 5-Year Review. Since that review, we have had two faculty members complete their FERP and 1 faculty member resign. So, even though we had a new hire in 2014 and another presumed to start in 2016, this still puts the Department at the same number of faculty at the time of the review.

   d. What has the unit done to maximize its current resources (i.e., to help itself?) over the past five years?
      The Department has maintained a nationally competitive master’s program with limited resources. The Department support staff has been reduced and the faculty has assumed responsibility for undergraduate student assessment and graduate student administration.
The Department is reliant on lecturers to teach the undergraduate service courses so that our faculty can teach graduate and upper division courses. Most of our courses are taught over their academic capacities. In the Fall Quarter, the average enrollment in our pure (i.e., non-tiered) graduate courses was 29.875; for the upcoming Winter Quarter, it is 28. We have diminished the number of distinct electives offered in our graduate program from what was offered at the time of our last five-year review. Because of high demand, we have had to offer two sections of our new data science electives (STAT 6610 and 6620).

All of our 9 Fall Quarter sections of lower division courses had enrollments above capacity, as did all of the 5 sections of primarily service courses (3010 and 3031).

Recently, we have implemented computer-graded homework in the large service courses. We expect that another tenure-track faculty member would enable the Department to have more tenure-line faculty participation in undergraduate major and service courses. In the five core required courses in the undergraduate major (3401, 3502, 3503, 4601, 3900/4950), it is typically the case that only one of these courses has been taught by a tenure-track/tenured faculty member per year. Last year and this year (coinciding with our hire two years ago), we have been able to increase this to 2 courses.

e. Has the department raised funds effectively from external sources? Has it worked effectively with external agencies and constituencies?
Yes, for student scholarships and Department Trust and Leadership accounts. These are listed in the order they were endowed:

Heebok Park Scholarship
George J. Resnikoff Memorial Scholarship
Statistics Department Scholarship
Justin Randle Memorial Scholarship
Bruce E. Trumbo Scholarship

19. Recruitment:

d. How will your department ensure that hiring is performed with the diversity goals of the University in mind?

1. Planned recruiting at conferences, meetings, etc.:
We hope to recruit for this position at the annual Joint Statistics Meetings (JMS). This event is sponsored jointly by the American Statistical Association (ASA), the Institute of Mathematical Statistics (IMS), the International Biometric Society, and the Statistical Society of Canada.

Advance approval of the position announcement, hopefully including the position number, will make it possible to distribute an estimated 300 copies of the "long" position announcement as follows: (i) on tables adjacent to the main registration area; (ii) at informational booths of consenting organizations, including IMS, ASA Women's Caucus, Chinese Statistical Association; (iii) at informal mixers and receptions for recent PhDs and current graduate students; (iv) at poster sessions presented by various CSUEB faculty and students; and (v) during personal conversations.
2. Advertisements in journals and newsletters:
   A. An announcement (approved "short" form) will be submitted for inclusion in the October, November, and December issues of *Amstat News* (published monthly by ASA) — recognized as the major place to post printed academic job announcements in statistics for the US (estimated cost for 2015 search: $450.00).
   B. An announcement (approved "short" form) will be placed in the October, November, and December issues of the *IMS Bulletin* (estimated cost for 2013 search: $140.00), and at no additional charge on the IMS jobs website (www.imstat.org/jobs).
   C. An announcement (approved “short” form) is planned for inclusion in the newsletter of the ASA Women's Caucus (estimated cost for 2013 search: less than $100.00).
   D. The Department will request that the job announcement be sent to the ASA’s Committee on Minorities in Statistics. It is unclear what the costs of such an announcement would be, but we estimate it to be similar to the cost for distribution to the Women’s Caucus newsletter.

3. Web advertising (no-cost postings):
   A. Announcements ("short" and "long") will be posted on our Departmental web site. Because of the course content our faculty members have included on this site, it is frequently visited by academic statisticians.
   B. An announcement (approved “short” form) will be submitted to the Florida State University statistics jobs website (www.stat.ufl.edu/vlib/jobs.html), a recognized center for such postings in statistics.
   C. An announcement (approved “short” form) will be submitted to the CSUEB Employment Development website.

4. Mailed announcements:
   A. Letters with announcements will be sent to an available list of departments with PhD programs in statistics/biostatistics/computational statistics (especially women and minority students).
   B. We will review the list of recipients of the CSU Forgivable Loan/Doctoral Incentive Program. Letters with announcements will be mailed to any/all individuals who appear to meet position requirements.

5. Personal contacts: Faculty members and alumni/ae will be encouraged to notify colleagues about this position.
   
   e. Is there a pressing need for a senior hire (tenured), either to ensure excellence or fill a leadership role?
      
      No.

   f. Can you collaborate with another department on advertising or other costs of recruitment?
      It is not feasible for us to collaborate with another department on advertising.
APPENDIX C

DEPARTMENT OF STATISTICS AND BIOSTATISTICS

SCHOLARSHIPS

- HEEBOK PARK SCHOLARSHIP
- GEORGE J. RESNIKOFF MEMORIAL SCHOLARSHIP
- STATISTICS DEPARTMENT SCHOLARSHIP
- JUSTIN RANDLE MEMORIAL SCHOLARSHIP
- BRUCE E. TRUMBO SCHOLARSHIP

HEEBOK PARK SCHOLARSHIP: The Heebok Park Scholarship was established in 1998 through donations made by CSUEB Statistics Department faculty, staff and students, other colleagues, the Park family, and personal friends. One (1) scholarship valued at $500 or more is offered annually to a CSUEB graduate student majoring in Statistics. The first of these scholarships was awarded in May 1999.

Dr. Park, who received his Ph.D. from the University of Chicago, came to CSUEB in 1967. Along with Drs. George Resnikoff, Bruce Trumbo, and William Sawrey, he was instrumental in building the Statistics Department. His primary concern was forging a strong Master's program that could hold its own against the best programs in the country. He served as Department Chair from Fall 1974 through Spring 1978 and as Graduate Advisor from Fall 1982 through Summer 1990. During his tenure as Graduate Advisor, the Master's program blossomed. He retired from teaching at the end of Fall Quarter 1996.

Dr. Park's popularity with our students was evident at his May 9, 1997 retirement party, which drew close to 200 people--mostly his former students. This is the largest event the Statistics Department has ever sponsored, and the most successful. Students and alumni spanning four decades--the lifetime of the Statistics Department--came to honor Dr. Park and wish him well, including our very first B.S. graduate (class of '68) and our second MS. graduate (class of '71). It was gratifying for members of the Statistics Department to witness the love, admiration, respect, and gratitude our students and alumni feel for Dr. Park, and their recognition of the impact his teaching had on their lives. This came through in the calls and messages received, as well as during the alumni testimonials presented at the Banquet. Dr. Park's success stemmed from his brilliance as an educator, but he didn't just teach statistics--he taught about life. He didn't just train our students to be statisticians--he trained them to be functioning adults. He didn't just teach our students to take their place in the world--he taught them to make a difference. Dr. Park didn't just welcome his students into the classroom, he became involved in their lives and welcomed them into his home. According to his students, two of the secrets to Dr. Park's phenomenal success were his ability to teach by setting an example and his ability to teach them to think.

The annual awarding of this scholarship honors Dr. Park's years of service and commitment to the Statistics Department, its students, and its programs.

GEORGE J. RESNIKOFF MEMORIAL SCHOLARSHIP: The George J. Resnikoff Memorial Scholarship was established in 1999 through donations made by CSUEB Statistics Department faculty, staff and students, other colleagues, professional people involved with local and national statistical organizations (e.g., IMS and ASA), the Resnikoff family, and personal friends. The contributor donor
list reads like a "who's who" in Statistics from the sixties and seventies. One (1) scholarship valued at $500 or more is offered annually to a CSUEB graduate student majoring in Statistics. The first of these scholarships was awarded Spring Quarter 2000.

Dr. Resnikoff, who received his Ph.D. from Stanford University, came to CSUEB in 1964 to found and Chair the Statistics Department. Later in his CSUEB career he held a number of administrative posts, including Dean of the School of Science (1970-71) and Dean of Graduate Studies (1972-79). After his retirement from the University in 1980, he returned occasionally to teach courses in Statistics until 1989.

Dr. Resnikoff's early statistical work centered on the use of mathematical analysis and emerging computer technology to produce accurate tables of statistical distributions. In his teaching, he was especially interested in finding ways to explain crucial statistical ideas to students with limited mathematical backgrounds. In addition to his university-related work, Dr. Resnikoff served the off-campus statistical community as Treasurer of the Institute of Mathematical Statistics (1964-72) and as Executive Secretary (1974-78). During his tenure as Treasurer, the IMS Business Office was established in Hayward.

At an on-campus memorial service held on September 30, 1994, Dr. Resnikoff's colleagues and friends shared stories and fond memories exhibiting his warmth and wonderful sense of humor. His colleagues and former students will long remember his advocacy for statistics as a discipline, his perceptive personal advice, his seemingly endless supply of engaging "war" stories from personal experiences during World War II, and his relentless support of the underdog in almost any economic, political, or social situation.

As faculty and alumni associated with the Statistics Department, we should all be proud of and grateful for the professional contributions of Dr. Resnikoff. His achievements--both within and outside the University--benefit us all because of the Department's stellar reputation. The annual awarding of this scholarship is a fitting memorial to his dedication and service to the Department, CSUEB, and the statistics community.

STATISTICS DEPARTMENT SCHOLARSHIP: The Statistics Department Scholarship was established in 1999 after receiving a very generous donation of stock from alumna Ann Olmsted. One (1) scholarship valued at $500 or more is offered annually to a CSUEB student majoring in Statistics. The first of these scholarships was awarded Spring Quarter 2000.

Ms. Olmsted entered our Master's Program in Statistics Fall Quarter 1982. She earned her Master's Degree in Fall Quarter 1983. Upon graduation, she was employed by Syntex Corporation, a pharmaceutical company that at the time employed a number of our graduates. Ms. Olmsted worked at Syntex from 1983 to 1985 as a SAS programmer, took the GREs, and was planning to return to school for a Ph.D. Instead, when her boss left for Texas, she became the senior animal health statistician at Syntex. She enjoyed the job so much she stayed until 1995, when Roche Corporation bought out Syntex and sold the animal health drugs.

In August 1995, Ms. Olmsted entered the Ph.D. program in Statistics at Texas A&M University. She defended her dissertation "Algorithms using chi-squared and other goodness-of-fit tests for identifying a high-expectation subset of independent Poisson random variables, or a subset of multinomial cells having relatively high probabilities, with applications in chromosomal fragile site identification" in August 1999. Her favorite part of the dissertation, which she dedicated to Dr. Heebok Park of the
CSUEB Statistics Department, is a proof of a multivariate version of the Lindeberg-Feller theorem, which was indicated by Dr. Daren Cline of the TAMU Statistics Department. Her least favorite part is a diskette containing the Fortran 90 implementation of the fragile site identification algorithm that she wrote and used for simulation experiments. Her doctorate was awarded December 1999.

Ms. Olmsted currently resides in Palo Alto and works as Senior Biostatistician at Matrix Pharmaceutical, Inc. in Fremont, a small company that develops drugs for cancer patients.

**JUSTIN RANDLE MEMORIAL SCHOLARSHIP:** The Justin Randle Memorial Scholarship was established in 2000 through donations made by the Zens and Randle families, CSUEB Statistics Department faculty, staff and students, other University colleagues, and personal friends. One (1) scholarship valued at $500 or more is offered annually to a CSUEB undergraduate or graduate student majoring in Statistics. Because of Mr. Randle's unique educational background and varied interests, preference may be given to someone who is changing fields (from undergraduate to graduate study) or who is an undergraduate double major (Statistics and another field). The first of these scholarships will be awarded Spring Quarter 2001.

Mr. Randle, a graduate of CSUEB in Psychology, died tragically in October 1996 in a windsurfing accident on the San Francisco Bay. After taking several Statistics courses, he had just entered the Master's program in Statistics, and his loss was felt deeply by faculty, staff, and his fellow students. He was a very kind, sensitive, caring person who deeply touched the lives of those who knew him. He worked in the Psychology and Statistics departments, assisting faculty in designing experiments, doing research projects and tutoring students. At the time of the accident, he was enrolled in courses in statistics, mathematics, and Vietnamese. He was a computer whiz who set a high standard of scholarship. In addition to windsurfing, his interests ranged from politics to classical music; he loved Thai food. In a world that is all too often torn by racial and cultural strife, he cultivated close friendships among students from other cultures.

At an on-campus Memorial Service held November 20, 1996, Mr. Randle was remembered fondly by CSUEB professors, students, and staff, as well as by his family and close personal friends. The stories shared illustrated his warmth and caring and underscored how greatly he will be missed. The annual awarding of this scholarship is a fitting memorial to Justin Randle's spirit, unending quest for knowledge, and dedication and service to his friends and fellow students.

**BRUCE E. TRUMBO SCHOLARSHIP:** The Bruce E. Trumbo Scholarship was established in 2008 through a donation made by Dr. Bruce Trumbo. One (1) scholarship valued at $500 or more is offered annually to a CSUEB graduate student majoring in Statistics or Biostatistics. The first of these scholarships was awarded in 2009.

Dr. Trumbo, who received his Ph.D. from the University of Chicago, came to CSUEB (formerly CSUH) in 1965. Along with Drs. George Resnikoff, Heebok Park, and William Sawrey, he was instrumental in building the Statistics Department. His primary concern was forging a strong Master's program that could hold its own against the best programs in the country. He served as Department Chair from Fall 1971 through Spring 1974 and as Graduate Coordinator from 1990 to the present. During his tenure as Graduate Coordinator, the Master's program in Statistics grew tremendously, and in Fall Quarter 2007 the Master’s program in Biostatistics was introduced (at which time the Department was renamed the Department of Statistics and Biostatistics). He retired from full-time teaching in September 2006, but he continues to teach part-time under the Faculty Early Retirement Program (FERP) and serve as the Graduate Admissions Advisor for the Statistics Master’s program.
In addition to being a highly-respected teacher and serving in many capacities within the Department, the College of Science, and the University, Dr. Trumbo has served the field of statistics through participating in its organizations. His outstanding contributions to these organizations include serving as Program Director for statistics research (1974-75, 1978-79, 1985-86) for the National Science Foundation (NSF), Treasurer (1982-85) of the Institute of Mathematical Statistics (IMS), Founding Editor of electronic version (1989-93) for the Current Index to Statistics (CIS), and Editor of Electronic Publications (1996-98) for the American Statistical Association (ASA).

Throughout his illustrious career, Dr. Trumbo’s contributions have garnered national and international recognition. He received the Founders’ Award from the Board of Directors of the ASA (1993), the Carver Award (2002) by IMS, and the Outstanding Professor Award (2003-04) by CSUEB. He has also been elected Fellow of the ASA and IMS.

Dr. Trumbo’s teaching has spanned five decades--the lifetime of the Department of Statistics and Biostatistics. The annual awarding of this scholarship honors his commitment to the Department, its students, and its programs. It also honors his years of service and many achievements--both within and outside the University. His efforts have been a major factor in attaining the Department's stellar reputation within educational circles as well as the private sector.
Date: May 19, 2019
To: Committee on Planning and Academic Review
From: Jason Singley, Dean, College of Science
Subject: Department of Statistics & Biostatistics Five-Year Review

I have reviewed the department’s Five-Year program review document including the self-study, five-year plan, external reviewer’s report, and the program’s response to the reviewer’s report. I will monitor the department’s response to any forthcoming CAPR recommendations and work with the department to implement their five-year plan within existing budgetary constraints.