California State University, East Bay

5-Year Review for the Department Of Statistics and Biostatistics

Review 2010-2011

Self Study and 5-Year Plan approved by faculty on: April 22, 2011: unanimous approval
External Reviewer Report received by the program on: October 4, 2011
Program’s Response to the External Reviewer’s Report completed on: October 5, 2011
Complete 5-Year Report submitted to CAPR on: October 6, 2011
Table of Contents

1. Summary of the Program.................................................................................................... 4

2. Self-Study............................................................................................................................ 5
   2.1 Summary of Previous Review and Plan................................................................ 5
   2.2 Curriculum and Student Learning........................................................................ 8
   2.3 Students and Faculty......................................................................................... 20
   2.4 Faculty............................................................................................................... 20
   2.5 Resources......................................................................................................... 21

3. The Plan.............................................................................................................................. 23
   3.1 Curriculum............................................................................................................ 23
   3.2 Students.............................................................................................................. 25
   3.3 Faculty................................................................................................................. 28
   3.4 Resources.......................................................................................................... 29

4. Outside Reviewer’s Report.................................................................................................. 30
   I. Introduction ............................................................................................................ 33
   II. National Trends and the CSUEB Statistics and Biostatistics Department......... 34
       a. Demand for Statistics Faculty ................................................................. 34
       b. Service Courses...................................................................................... 35
       c. Degree Programs.................................................................................... 36
          1. Master’s Degrees.............................................................................. 36
          2. Undergraduate Degrees................................................................. 38
       d. Statistical Consulting .......................................................................... 38
       e. Research Directions............................................................................ 39
   III. Major Recommendations and Summary............................................................... 39
       a. Increase the faculty size by five............................................................ 39
       b. Increase the number of service course offerings............................. 40
   In Summary............................................................................................................... 40

5. Program Response to Outside Reviewer Report............................................................ 41
   3.1 Curriculum........................................................................................................... 41
   3.2 Students............................................................................................................. 42
   3.3 Faculty.............................................................................................................. 42
   3.4 Resources......................................................................................................... 42
   3.5 Recommendations............................................................................................ 43
   3.6 Clarifications................................................................................................... 44
5. Program Response to Outside Reviewer Report (Continued)
   3.7 Priorities for Next Five Years................................................................. 45
   3.8 Summary................................................................................................. 45

Appendices........................................................................................................... 46

A. Application to the Council of Graduate Schools (CGS) for Professional Science Master’s
   (PSM) Affiliation............................................................................................... 47
B. MS Degree in Statistics.................................................................................. 57
C. MS Degree in Biostatistics............................................................................. 63
D. BS Degree in Statistics.................................................................................. 70
E. CSUEB Enrollment and FTES....................................................................... 81
F. CSUEB Overall Enrollment by Ethnicity and Gender.................................... 81
G. CSUEB College Enrollment and FTES........................................................ 81
H. CSUEB APR Summary Data 2005-2009....................................................... 82
I. 11-12 Tenure-track Faculty Hire Request—New Faculty Justification: Department of
   Statistics and Biostatistics............................................................................ 85
J. Virtual Computer Lab Presentation made by Prof. Eric Suess at the Back to the Bay
   Conference Fall 2010 and in Academic Senate Fall 2010............................. 93
K. Department of Statistics and Biostatistics Scholarships.............................. 112
1. Summary of the Program

2. Self-Study
   2.1 Summary of Previous Review and Plan
   2.2 Curriculum and Student Learning
   2.3 Students and Faculty
   2.4 Faculty
   2.5 Resources

3. The Plan
   3.1 Curriculum
   3.2 Students
   3.3 Faculty
   3.4 Resources

4. Outside Reviewer’s Report
   I. Introduction
   II. National Trends and the CSUEB Statistics and Biostatistics Department
      a. Demand for Statistics Faculty
      b. Service Courses
      c. Degree Programs
         1. Master’s Degrees
         2. Undergraduate Degrees
      d. Statistical Consulting
      e. Research Directions
   III. Major Recommendations and Summary
      a. Increase the faculty size by five
      b. Increase the number of service course offerings
   In Summary

5. Program Response to Outside Reviewer Report
   3.1 Curriculum
   3.2 Students
   3.3 Faculty
   3.4 Resources
   3.5 Recommendations
   3.6 Clarifications
   3.7 Priorities for Next Five Years
   3.8 Summary
2. Self-Study

2.1 Summary of Previous Review and Plan

Our last program review was undertaken in 2004-05, and the outside reviewer was Dr. Mary Ellen Bock of Purdue University. Dr. Bock has served as Chair of the Department of Statistics at Purdue, and she has served as the President of the American Statistical Association. Dr. Bock has has been our outside reviewer for our last two reviews, and her vision has been very helpful in formulating our Department growth and development over the last decade.

The primary issue raised in the last 5-year Review was curriculum re-development in the directions of Computational Statistics, Biostatistics, and Statistical Time Series.

Since the last review, the Department has introduced more computation/statistical computing topics in undergraduate major and graduate-level courses. We have created a graduate course in SAS programming, STAT 6250, and continued to offer STAT 4910, Advanced Statistical Package Usage, the undergraduate version of this class; these courses are usually taught as a two-tiered course. STAT 6250, is a required course in our MS Biostatistics program and an elective in our MS Statistics program; STAT 4910 is an elective in our undergraduate program. We have introduced the R programming language in the first-year graduate courses, in STAT 6204, Probability Theory, and STAT 6205, Statistical Theory. In addition, we have introduced this software in some major courses (e.g., STAT 3502, Statistical Inference I).

Since the last review, the Department has developed and begun offering the MS degree in Biostatistics; as a result, our name has changed to the Department the Statistics and Biostatistics. The development of this degree program was funded by participation in the CSU
system-wide SLOAN grants, which supported the development of Professional Science Masters (PSM) degree programs. The MS degree in Biostatistics has been available since the Fall of 2007 and was formally approved as a PSM in Fall 2009. (See Appendix A, Approved Application to the Council of Graduate Schools [CGS] for Professional Science Masters [PSM] Designation.) Enrollments in this program have grown each year since it was introduced. This effort included the creation of the following four new courses, primarily offered in the second year of the graduate programs: BSTA 6651 (Analysis of Categorical Data in Biostatistics), BSTA 6652 Survival Analysis in Biostatistics), BSTA 6653 (Clinical Trials in the Pharmaceutical and Biomedical Industries), STAT 6250 (SAS Programming). Our Department is participating in an NSF funded program to award full scholarships to two students in our MS program in Biostatistics for each of the following years: 2009-10, 2010-11, 2011-12.

Since the last 5-year Review, the Department has created the following graduate class in Statistics: STAT 6555, Statistical Time Series Analysis; we have offered this class multiple times over the last five years.

The Department has successfully separated the offerings of the first-year graduate classes from the undergraduate classes (formerly, they were offered in two-tiered format). This effort included the creation of five new courses for the first year of the graduate program: STAT 6204, Probability Theory; STAT 6205, Statistical Theroy; STAT 6304, Advanced Statistical Inference; STAT 6305, Analysis of Variance Models; and STAT 6310, Advanced Stochastic Processes and Simulation. The ability to finally offer separate major classes (rather than a two-tiered class) to our undergraduate and graduate students has been a major factor in the the growth of our undergraduate and graduate programs.

Since the last review, we have been able to hire five tenure-track faculty members. An additional tenure-track hire was in place and participated in the last review. That first hire has since left the Department, but we retain the other five most recent faculty hires. Since the last review, one FERPing faculty member has left service, and one additional faculty member has entered the FERP Program. Currently we have two faculty members participating in the FERP program. One of the current FERPing faculty members will end his FERP Spring 2011. The remaining FERPing faculty member has two more years of service.

Since the last review, the Department was able to fill a .75 vacant staff position (the lengthy position vacancy was related to a system-wide staff hiring freeze). This second staff member worked almost exclusively with Masters’ student admissions, general student advising, filing for graduation, organizing the student-related delivery of our MS Exams (Fall and Spring Quarters); she was the main contact person for the delivery of the PSM related aspects of our MS program in Biostatistics. Due to budget considerations, Summer Quarter 2010 this staff member was reassigned to a different department within the College of Science. In October 2010, the Department was able to hire a .5 Student Assistant to help with much of the work formerly performed by the transferred staff member; the rest of her work was re-assigned to the 1.0 remaining staff member or faculty, or the work is no longer being performed.
With the exception of STAT 3040 (Probability, Risk, and Chance) and STAT 3050 (Statistics: from Data to Decisions), the Department is currently offering the same service courses we were offering at the time of the last review. These service courses are taken by students in a number of majors across campus, including Biology, Business, Computer Science, and Engineering, Psychology, and Sociology. We plan to again offer STAT 3050 when we have the monetary and faculty resources to do so. The STAT 1000 (Elements of Probability and Statistics) course enrollments have increased due a change in the Business College requirements. Formerly, they required STAT 2010, Elements of Statistics for Business and Economics; currently they require either STAT 1000 or STAT 2010. Since the last review, the Department has created the following upper-division GE courses, STAT 3040, Probability, Risk, and Chance, and STAT 3050, Statistics: from Data to Decisions. STAT 3040 was offered once and STAT 3050 was offered three times. Both courses have not been offered in recent years due to budget cuts and the loss of full-time faculty; in fact, Stat 3040 no longer appears in our course listings due to the inability to offer this course on a regular basis. The Department also created a lower-division GE course (Stat 2008, Introductory Statistics Through Sports) offered through the Freshman cluster program. This cluster combined STAT 2008 with courses offered through the Departments of Kinesiology and Economics. This cluster was offered only one year; it was discontinued due to changes in the availability of faculty in the other departments.

Since the last review, two of our faculty participated in workshops offered through the Office of Faculty Development related to the development of plans for offering Statistical Consulting Services to the University. While these plans have been in the development stage for quite a while, the effort continues to find the needed resources (e.g., faculty release time and financial compensation) to make these services available to the University faculty.

Again due to budget constraints, Summer Quarter 2010 the Department has lost a Statistics/Biostatistics-designated computer lab that we had outgrown. Our former lab was combined with another lab, resulting in a College of Science Computer Lab with 50-computer access. This is approximately double the number of computers that were available in the Statistics computer lab that was closed. Access to this larger computer lab has resulted in improved services to our faculty/students during class instruction and the administration of the Open Book part of our Masters’ Exams. However, loss of our Department-designated computer lab, coupled with greatly reduced campus-wide computer availability for students and limited availability of Statistical software on campus-wide computers with student access, has resulted in a loss in computer-available service to our students on an individual basis.

Our faculty members have worked with many students who have gone to statistics conferences to give posters. They have also encouraged and recommended our students to attend PhD programs in Statistics and related fields.

Our faculty developed plans for working with a Professional Industry Advisory Board, and they have made considerable effort to develop our connections with industry. However, our primary activity related to industry continues to involve our faculty sending job announcements received from prospective employers to our students and graduates.
2.2 Curriculum and Student Learning

Curriculum

**MS degrees:** Since the last review, the faculty has made the following curriculum additions/changes: created a new MS degree program in Biostatistics, eliminated the Options in “Theoretical and Applied” and “Biostatistics” from the MS program in Statistics, and added an “Applied Statistics” Option to the MS program in Statistics. We have added BSTA 6652 (Survival Analysis in Biostatistics) and BSTA 6653 (Clinical Trials in the Pharmaceutical and Biomedical Industries) to our course offerings; these courses are offered yearly, as they are required for the MS degree program in Biostatistics. STAT 6204 (Probability Theory), STAT 6205 (Statistical Theory), and STAT 6304 (Advanced Statistical Inference) have also been added to the Catalog. These courses are required for the MS degree programs in Biostatistics and Statistics, thus are offered at least yearly. These courses have streamlined the degree programs’ STAT 6204 and STAT 6304, in particular, are the first-quarter (gateway) courses for both MS programs. In recent years, two sections of each of the gateway courses have been offered during Fall Quarter. In other quarters, because of limited availability of faculty, STAT 6204 and STAT 6304 are often “tiered” with their undergraduate counterparts (STAT 3401, Introduction to Probability I, and STAT 3502, Statistical Inference, respectively). Because of these new courses, all Statistics courses that apply to our MS degrees are at the graduate (6000) level. (Refer to Appendices B and C for more information about our MS programs in Statistics and Biostatistics.)

In 2005, there were 68 students enrolled in our MS program in Statistics. In 2009 (the most recent date for which data is available from Institutional Research), there were 88 students enrolled in our MS program in Statistics and 38 students enrolled in our MS program in Biostatistics. Our graduate program offerings are now, by far, the largest in the College of Science.

There are no free-standing Master’s Degree programs in Statistics or Biostatistics in the CSU. Statistics master’s programs offered through Mathematics Department in the CSU are different from our degree program. By utilizing Dr. Mary Ellen Bock as our outside reviewer and following her recommendations, we have developed high-quality programs that successfully compete with Master’s programs in Statistics and Biostatistics throughout the United States.

**BS degree and minor:** At the time of the last review, the number of BS majors in Statistics was 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). Departmental records show seven students graduated with a Statistics minor during 2004-05, the year of our last review. Fall 2010 there were 25 students who listed Statistics as a minor. Our Fall Quarter (“on track”) offerings of the core STAT 3401 (Introduction to Probability Theory I) and STAT 3502 (Statistical Inference I) courses are now separate from graduate courses. Additionally, Statistics MS
students are no longer enrolled in the following undergraduate courses: STAT 3402 (Introduction to Probability Theory II), STAT 3503 (Statistical Inference II), and STAT 4601 (Regression). With the exceptions of STAT 3510 (Sampling Procedures for Surveys), STAT 3900 (Data Analysis Using Statistical Packages), and STAT 4950 (Advanced Statistical Packages for Data Analysis), recently-offered upper-division elective courses in the major—particularly STAT 4515 (Applied Multivariate Analysis), STAT 4610 (Introduction to Nonparametric Statistical Methods), STAT 4910 (Advanced Statistical Package Usage), and seminar courses—have been “tiered” with graduate courses because of faculty availability or low enrollment. (Refer to Appendix D for more information about our BS program in Statistics.)

Service to the campus: At the undergraduate level, the Department of Statistics and Biostatistics serves the University by providing courses to the areas of B4 Quantitative Reasoning (STAT 1000, Elements of Probability and Statistics; STAT 2008, Introductory Statistics Through Sports; STAT 2010, Elements of Statistics for Business and Economics), D4 Upper Division Social Science (STAT 3510, Sampling Procedures for Surveys; STAT 4000 Analysis of Variance in the Behavioral Sciences), and B6 Upper Division Science (STAT 3040, Probability, Risk, and Chance; STAT 3050, Statistics: from Data to Decisions). The B4 courses are required by all programs in the College of Business and Economics, most of the programs in the College of Science, and many programs in the College of Letters, Arts, and Social Sciences. In academic years 2007-08 and 2008-09 STAT 3050 was a popular course—offered multiple times during those years and drawing between 25 and 40 students. As was mentioned earlier, Stat 3040 no longer appears in our course listings due to the inability to offer this course on a regular basis; STAT 3050 has not been offered during in the past two years due to limited faculty availability. STAT 3510 served 15 undergraduate non-majors in Fall Quarter 2010 and a handful of graduate students from other departments. In Fall 2008, STAT 2008 was offered as a cluster course, primarily for Business majors; however, due to faculty availability in the other two departments, this cluster has not been offered since. Unfortunately, by design, courses offered as part of a cluster cannot be offered outside the cluster.

Student Learning

Refer to the following Appendices for information related to student enrollment:

E. CSUEB Enrollment and FTES.
F. CSUEB Overall Enrollment by Ethnicity and Gender.
G. CSUEB College Enrollment and FTES.
MS student assessment - MS exam summaries

Approximately five years ago we instituted new procedures related to preparing our MS Exam. Under the new process, we meet collectively to review and discuss all problems submitted for the MS Exam. This process was implemented in order for our new tenure-track faculty (by far the largest percentage of our full-time faculty) to learn the process and assess the type and difficulty level of questions that are appropriate for our exams. Essentially, this process has provided a training ground for the new faculty in writing exam questions. This process has been very useful in maintaining the overall Departmental excellence in preparing these exams.

Below we present the overall analysis of the scores on our MS Exams for the last few years.

Histogram of all scores. Showing a slight skew.
Boxplots of the scores by exam date, Fall and Spring. We use this plot to monitor the overall difficulty of the exams over time.

<table>
<thead>
<tr>
<th>Term</th>
<th>N</th>
<th>Mean</th>
<th>StDev</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004 Fall</td>
<td>4</td>
<td>78.25</td>
<td>6.27</td>
<td>76.88</td>
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<tr>
<td>2004 Spring</td>
<td>22</td>
<td>74.44</td>
<td>10.62</td>
<td>75.38</td>
</tr>
<tr>
<td>2005 Fall</td>
<td>19</td>
<td>70.63</td>
<td>13.7</td>
<td>72.5</td>
</tr>
<tr>
<td>2005 Spring</td>
<td>24</td>
<td>74.59</td>
<td>12.13</td>
<td>78.63</td>
</tr>
<tr>
<td>2006 Fall</td>
<td>17</td>
<td>65.59</td>
<td>14.89</td>
<td>65.75</td>
</tr>
<tr>
<td>2006 Spring</td>
<td>19</td>
<td>69.64</td>
<td>14.5</td>
<td>68.63</td>
</tr>
<tr>
<td>2007 Fall</td>
<td>19</td>
<td>69.99</td>
<td>15.48</td>
<td>69.63</td>
</tr>
<tr>
<td>2007 Spring</td>
<td>22</td>
<td>73.26</td>
<td>15.14</td>
<td>74.25</td>
</tr>
<tr>
<td>2008 Fall</td>
<td>13</td>
<td>57.32</td>
<td>17.2</td>
<td>54.88</td>
</tr>
<tr>
<td>2008 Spring</td>
<td>22</td>
<td>77.59</td>
<td>10.58</td>
<td>78.63</td>
</tr>
<tr>
<td>2009 Fall</td>
<td>20</td>
<td>66.55</td>
<td>10.13</td>
<td>66.13</td>
</tr>
<tr>
<td>2009 Spring</td>
<td>30</td>
<td>63.09</td>
<td>15.28</td>
<td>57.81</td>
</tr>
<tr>
<td>2010 Fall</td>
<td>15</td>
<td>58.63</td>
<td>15.19</td>
<td>62.75</td>
</tr>
<tr>
<td>2010 Spring</td>
<td>41</td>
<td>72.89</td>
<td>11.39</td>
<td>73</td>
</tr>
</tbody>
</table>
And by degree major:

Variable Major N Mean StDev Median
Grades BSTA 41 68.63 11.48 69.88
STAT 246 69.889 14.639 72.563

And by term and degree major:

Results for Major = BSTA

Variable Term N Mean StDev Median
Grades 2009 Fall 5 63.55 8.16 64.88
2009 Spring 12 68.52 13.10 70.56
2010 Fall 5 61.58 12.37 68.00
2010 Spring 19 71.88 10.34 72.00

Results for Major = STAT

Variable Term N Mean StDev Median
Grades 2004 Fall 4 78.25 6.27 76.88
2004 Spring 22 74.44 10.62 75.38
2005 Fall 19 70.63 13.70 72.50
2005 Spring 24 74.59 12.13 78.63
2006 Fall 17 65.59 14.89 65.75
2006 Spring 19 69.64 14.50 68.63
2007 Fall 19 69.99 15.48 69.63
2007 Spring 22 73.26 15.14 74.25
2008 Fall 13 57.32 17.20 54.88
2008 Spring 22 77.59 10.58 78.63
2009 Fall 15 67.55 10.77 67.38
2009 Spring 18 59.47 15.89 55.88
2010 Fall 10 57.15 16.85 55.63
2010 Spring 22 73.76 12.40 75.50

Undergraduate Statistics assessment

Since 1998 many of the faculty at CSU East Bay, Department of Statistics and Biostatistics, participate in having a portion of all finals in lower-division Statistics courses common to every final examination. We have used a basic set of 20 questions with an underlying theme in each question. The individual questions themselves are modified regularly, but the topics covered and the difficulty remain reasonably constant.

Considering all of the available 4,578 exams given over the past 13 years, we have asked a number of questions. One consideration is whether the scores of students taking courses from regular faculty and other faculty are similar. Pretending that these exams represent a random sample of all possible exams, the analysis of variance results conclude that there are significant differences in the four groups of faculty: temporary, annual appointments, tenure-track, and
tenured. However, this pretense is not a reasonable one. A better idea is to view the results visually.

Figure 1 graphs the percent of correct results out of 20 questions by instructor group. At least one interpretation of this graph is that increased faculty security increases student scores on this assessment exam. Scores for students in courses with faculty who are appointed annually are higher than scores for students with temporary faculty. Scores for students in courses with faculty who have tenure are higher than scores for students with faculty working toward tenure.

Figure 2 considers percent acquisition for the student learning outcomes, literacy, skills, and thinking in two previous review periods and the current review period.

Figures 3 and 4 consider the grades assigned in courses along side the percent acquisition for the topics covered in courses for the two review periods. As expected, there is separation between the grades; however, fewer grades are available for the second review period. Some of the results include students attempting to “test out” of an introductory course who were given these 20 questions along with the course materials. For these students, previous knowledge may lead to higher scores on the assessment exam, but lower scores over all. When grades are not considered, Figure 5 shows that the two time periods track fairly closely for all topics. There are more nearly equal numbers of students in this figure, since grades are not as easily available as in previous periods.

Finally, we return to our proposed student learning outcomes and study percent acquisition of these outcomes based on course prerequisite (Figure 6). There is good separation in the level of acquisition by difficulty of prerequisite. Courses requiring only college algebra are lower than courses requiring some college mathematics, while courses requiring calculus have the highest level of acquisition of these outcomes.
Figure 1. Relationship between student acquisition (percent correct) and type of instructor.
Figure 2. Percent Acquisition of Student Learning Outcomes comparing results from last review prior to 2005 and 2005 or later.
Figure 3. Acquisition of Topics Covered by Grade for 1999 through 2004.
Figure 4. Percent Acquisition of Topics Covered by Grade for Review period 2005 through 2010.
Figure 5. Percent Acquisition of Topics covered by review periods.
Figure 6. Acquisition of Learning Outcomes considering course prerequisites for all available data.
2.3 Students and Faculty

a) Student demographics of majors, minors, and options


b) Student level of majors, minors, and options


c) Faculty and academic allocation

Prof. Lynn Eudey, Associate Professor
Prof. Joshua Kerr, Assistant Professor
Prof. Kelly Fan, Associate Professor
Prof. Eric A. Suess, Professor, Chair
Prof. Mitchell Watnik, Associate Professor
Prof. YanYan Zhou, Assistant Professor

Prof. Bruce Trumbo, Emeritus
Prof. Julia Norton, Emeritus

Dr. Steffan Fredericson, Lecturer
Dr. David Laffie, Lecturer
Dr. Ward Rodriguez, Lecturer
Dr. Clayton Shupp, Lecturer
Dr. Clyde Sugahara, Lecturer


d) Course data

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

2.4 Faculty

Since the last review, the primary faculty changes to our Department are related to loss of faculty. During the last three years, Dr. Jaimyoung Kwon left CSUEB to accept a position in the private sector. Dr. Kwon left the University around the time when he could have received tenure
and promotion. Additionally, we have lost one long-term lecturer who taught SAS Programming courses during the last three years.

Since the last review, another primary faculty change within our Department is related to faculty stature within the University. Three faculty members have completed this process. Dr. Mitchell Watnik received tenure and promotion effective Fall 2009. Drs. Lynn Eudey and Kelly Fan received tenure and promotion effective Fall 2010.

The Department of Statistics and Biostatistics submitted a request for a new faculty member Fall 2011. Every department in the College of Science submitted an application. Our application ranked in the middle of the list of requests. (See Appendix I for our 11-12 tenure-track faculty hire request, titled New Faculty Justification: Department of Statistics and Biostatistics.)

Since the last review, a number of our faculty members have attended the annual Joint Statistical Conference 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.

2.5 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, 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 teachers to have more opportunities to take students to the lab to experience hands-on exposure to statistical software and data.

The University Virtual Computer Lab (VCL) is a new service provided to students that allows access to computer software. (Refer to Appendix J for a presentation provided to all faculty by Professor Eric A. Suess on the use of the VCL.) 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, the VCL has continued to make SPSS available to students. The VCL has also made access to SAS more easily accessible in classes. The newest version of SAS has proven to be very difficult for students to install on their personal computers, because of conflicts with 64 bit versions of Windows Vista and Win7.

Our Department has been a long-time user of the College of Science 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 faculty members recruit 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 mycsueastbay system that was implemented a few years ago to record class grades electronically. The Statistics Major 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.

Our faculty members have made use of the University Google email system for communication with faculty, students, administrators, alumni, and others. Our faculty members 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.

Despite the above-mentioned technological improvements, all computers used by our faculty are more than three years old, and many Departmental computers are more than five years old. Some faculty members have purchased their own computers to replace older Departmental computers that are broken.

The Department provides resources to students through awarding annual scholarships. Prior to our last review, the Department had established four scholarships into perpetuity. Office staff member Ann Cambra was assigned primary responsibility for raising scholarship funds. Over a period of several years, she raised over $82,000.00, 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 K for more information about our 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 Administrative Support Coordinator, Ann Cambra, continues to serve in the lead staff role. Between 2005 and 2010, she was assisted by Administrative Support Coordinator Peggy Towers, who served as a student liason and was crucial in our efforts to recruit students for our graduate programs. However, Ms. Towers’ .75 position was eliminated in Summer Quarter 2010, when she was transferred to the Department of Chemistry and Biochemistry. In October 2010 we were authorized to hire a .5 Student Assistant, Mr. Salem Hararah. Mr. Hararah has done a remarkable job assisting our graduate applicants and students; however, he is not allowed to perform duties related to accessing student data in various University computer information systems (e.g., PeopleSoft/Students, Singularity). This restriction places additional burdens on Ms. Cambra, the Department Chair, and members of our faculty.

3. The Plan

3.1 Curriculum

After reviewing the self-study and assessment materials, the Department of Statistics and Biostatistics proposes the following improvements to our programs:

**MS degree programs:**

1. We envision continuing making curricular changes related to our MS degree programs. We are proposing adding a nonparametrics course, which was offered as a seminar (STAT 6872, Seminar in Probability and Statistics) in Winter Quarter 2011. We also plan to offer a design of experiments course as a graduate elective, separate from STAT 6305, Analysis of Variance Models.

2. Most of our on-track required graduate courses have now been separated from our BS courses. Off-track courses (e.g., STAT 6304, Advanced Statistical Inference, offered in Spring Quarter) remain “tiered,” because we do not have a sufficient number of students at the undergraduate level to offer those courses separately. Recently, some elective courses (e.g., the Fall Quarter offering of STAT 6250, SAS Programming; STAT 6550, Bayesian Statistics; STAT 6872, Seminar in Probability and Statistics) have been “tiered” to accommodate undergraduates, for whom there are insufficient electives.

3. With the exception of Fall Quarter 2007 (following the seemingly anomalous 2006), our MS programs continue to grow. We are close to capacity for the current size of our
faculty, offering two sections of required graduate courses in on-track quarters. Even offer two sections of these courses, most sections have over 30 students, with many sections reaching 50 students (twice the maximum capacity). In order to continue growing our Masters’ programs, the Department needs to hire additional tenure-track faculty members.

4. Our faculty members, and particularly our graduate advisors, use Blackboard lists to communicate with students, offering general on-track advising during first-pass enrollment. In September, the graduate advisors host orientation sessions for new students and a “reorientation” session for continuing students. These contacts keep students informed and give students increased access to program advising. Professors Watnik and Trumbo currently advise students enrolled in our MS Statistics program; Professors Eudey and Suess currently advise our MS Biostatistics students.

5. Due to the implementation of our MS program in Biostatistics, the Biostatistics Option in the MS program in Statistics was retired. The Option in “Theoretical and Applied Statistics” was changed to “Applied Statistics” (with theoretical students taking the Option in “Mathematical Statistics”). Because of the loss of full-time faculty, the Department has been unable to offer elective courses supporting separate “Applied” and “Computational” Options. Students enrolled in either of these Options often take the same courses. However, we do not wish to combine these Options.

BS degree program and minor:

1. We envision continuing curricular changes related to our undergraduate programs. We are proposing allowing undergraduate majors to take STAT 3050 (Statistics: from Data to Decisions) in order to allow us to continue to offer this course. We are discussing dropping STAT 3503 (Statistical Inference II) as a prerequisite to STAT 4601 (Regression) in order to allow a more modern approach to the topic and to increase enrollment. STAT 4910 (Advanced Statistical Package Usage) has been revived as a tiered course with the Fall Quarter offering of STAT 6250 (SAS Programming); this change has given undergraduate students better access and experience with SAS.

2. The BS program in Statistics has grown from 10 students in 2005 to 20 students in 2009 (and 26 in 2010). This increase is due to many factors, including increased high school awareness of the field of statistics, more faculty participating as undergraduate advisors, the separation of core undergraduate courses from their graduate-level counterparts, and more tenure-track and tenured faculty members teaching introductory courses and recruiting Statistics undergraduate majors from those courses. Our faculty advisors use Blackboard to communicate general advising to our undergraduate majors, particularly during first-pass registration, so our students are aware of the courses available to them. We look forward to continuing to grow our undergraduate program. (See “3. The Plan/3.2 Students” for information on recent developments concerning a plan to attract BS Statistics majors.

3. Minors are hard to track, as many do not declare until they file to graduate. However, faculty members actively recruit minors from lower-division and service courses; two
faculty members, Dr. Ward Rodriguez and Professor Joshua Kerr, serve as advisors for minors.

All programs:

1. We will request additional faculty members to replace Professors Michael Orkin (retired) and Bruce Trumbo (who is finishing his FERP at the end of this academic year), Julia Norton (who is finishing the second year of her FERP), and Jaimyoung Kwon (a junior faculty member who resigned his position at CSUEB in order to accept a position in the private sector). Since our graduate course offerings, in particular, are at capacity and the service and undergraduate program offerings have been cut back because of the size of the current faculty, tenure-track replacements are needed to allow for the restoration of undergraduate course offerings and the continued ability to maintain, if not grow, graduate course offerings.

2. The Department’s 20-station computer lab was lost at the end of the 2009-10 academic year. This has proven to be a mixed blessing, as instructors who were not able to take overenrolled classes, such as STAT 6509 (Theory and Application of Regression), to the 20-station lab now may use the 50-station College of Science computer lab for these large classes. The downside is competition from other departments to use this lab. Another problem with the loss of this lab is the inability of our students to use the “Stat Lab” for on-campus studying, with access to statistical packages like R and SAS. The Department has tried to compensate for this loss by being involved with the campus’ experimental “virtual computing lab” (VCL). Professor Eric Suess and Dr. Ward Rodriguez were in the vanguard for VCL use, with Professors Mitchell Watnik and Joshua Kerr quickly coming aboard. Now, most of the tenure-track/tenured faculty and established lectures use the VCL for courses with data analysis components. Besides the computer lab, the Department relies upon computing services to maintain the licenses for software for our courses (e.g., SAS and SPSS). Losing the license to SAS, most particularly, would be devastating to our degree programs.

3.2 Students

Although we had hoped to continue to grow our MS programs in Statistics and Biostatistics, our success will, in large part, depend on funding. Given the current budget situation, we anticipate the number of students in our graduate programs to continue at the same levels, assuming the duties formerly performed by a .75 staff member (who was reassigned to another department in the College of Science, thus the staff position has been lost) can be handled by a .5 Student Assistant, our remaining 1.0 staff member, and faculty. We have adapted to the change in staff; however, passage of time will determine (a) if we are meeting the needs of our applicants and current students, and (b) if we are able handle these changes long-term.

We are actively pursuing new Freshman and transfer students for our BS and minor programs.
In recent years, our BS program has begun to grow, and we hope to continue to increase this success. To this end, staff member Ann Cambra and Chair Eric Suess recently met with Michelle LaCentra (Articulation Officer, Academic Programs and Graduate Studies) and designed an undergraduate Statistics program which will become part of the Mathematics Transfer Model Curriculum (TMC), a program supported by the CSU Chancellor’s Office. Our Statistics BS degree is similar to the Mathematics TMC, and community college students completing this Mathematics Associate Degree can transfer into our BS program. By participating in the TMS program (SB1440), we will gain much-needed publicity for our BS program. As a result, we anticipate an increase in junior-level students transferring into our BS major. Historically, our BS majors find our Department after they have transferred to CSUEB and are already pursuing another major.

We have some capacity in our courses now to accommodate increases in the number of students enrolled in our Masters’ and Bachelor’s programs. The main adjustment we would have to make if our major numbers increase is the faculty having to teach larger classes than we currently offer. However, they are already doing this when teaching service courses.

Historically, we have always seen increases in student enrollments during bad economic times, which we are now experiencing nation-wide. And we have always seen some decreases in student enrollments when the economy rebounds. We are unable to predict if the second trend will continue, once the economy recovers. However, our plans are to continue our student recruiting efforts in hopes of maintaining our current enrolments into the future.

The primary learn goal that we need to address, which has been a shortcoming in our program for many years, is to increase the use—at all levels—of computation in the classes. This has been made more difficult by the recent closure of computer labs throughout campus, but this change has been softened with the creation in Fall Quarter 2010 of the Virtual Computing Lab (VCL). Recently our faculty members have been discussing the possibility of requiring our Masters’ students to have access to their own personal laptop computer for use in classes and during our MS Exams. To date, we have been directed by the administration not to make such a requirement for participation in our graduate programs.

Our plan to maintain our student enrollment is to continue to teach afternoon and evening classes. Our faculty members have continued to teach graduate and undergraduate class at times when students can take the classes. This has been a rather large burden on our faculty, in particular to regularly teach from 8 - 9:50 pm two nights a week. Doing this is very tiring for faculty. All faculty in the Department participate in this late evening teaching schedule. There is a continual struggle to maintain this level of dedication in our faculty, in order to sustain the growth in our programs. However, it is clear that offering night classes is a primary reason we have been able to grow our programs over the last five to 10 years. Another primary reason for the recent growth is the large number of International students who have been attracted to our programs.
Our MS program in Biostatistics program has not yet received any direct University support for faculty graduate advising. Beginning Fall 2009, our Department was allocated 2.0 WTU for this purpose, the first year of offering this program as part of the Professional Science Masters (PSM) program; however, before the Fall term started, this faculty release time was removed. Our PSM program has no advisor; additionally, we have made the decision to cut the graduate advisor release units for our much larger MS program in Statistics in order to internally support our new Biostatistics program through providing faculty graduate advisor release time. Our PSM program has no director and, with the loss of our .75 staff member, no staff support. After working nearly eight years and spending all of the SLOAN grant money to achieve this prized designation, we have not been able to deliver all of the requirements related to our students and industry partners and all of the requirements for maintaining the PSM designation. Despite these problems, our MS program in Biostatistics is strong and growing.

The communication lines between students and faculty are open. All faculty members hold the required number of office hours for their classes. Additionally, our Department has worked hard to provide important support for our students. In the future, we would like to enhance the level of support provided, in the following areas: internships, scholarships, and private funding, as discussed in the following three paragraphs.

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.

We would like to provide additional financial support to our students through raising funds to establish more scholarships. In particular, now that we have a successful Master’s program in Biostatistics, we would like to establish a scholarship dedicated to Biostatistics majors. Also, we would like to raise funds to double the size of the Bruce E. Trumbo Scholarship, bringing it up to the level of the other four established scholarships. Because scholarship fundraising duties were administratively removed from staff member Ann Cambra’s duties (which explains why our scholarship fundraising efforts ended), we need to find a new method for handling fundraising.

Finally, we have two departmental accounts—the Statistics Trust Fund and the Statistics Leadership Fund—which are funded through private donations. These funds are used to pay for such things as increasing the annual scholarship awards, the cost for the annual student scholarship luncheon, and student travel to statistics conferences to make poster presentations. We would like to undertake fundraising efforts to increase the size of these accounts, in order to provide additional financial support to our students. Refer to “3.3 Faculty” (below) for additional information on the Trust and Leadership accounts as they relate to faculty.
3.3 Faculty

The main Department faculty changes, expected in the near future, are related to faculty stature within the University. We anticipate that Dr. YanYan Zhou will receive tenure and promotion effective Fall Quarter 2011. We anticipate that Dr. Joshua Kerr will be retained effective Fall Quarter 2010. Further, we anticipate that Dr. Kerr will receive tenure and promotion effective Fall Quarter 2012. 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 two remaining FERPing faculty. One of their terms ends Spring 2011; the other’s term will end during the next 3 years. Two of our long-term contract lecturers will likely retire during the next five years. 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 number of faculty positions already lost (see “2. Self-Study/2.4 Faculty” above), we requested a tenure-track faculty search for Fall Quarter 2012. However, our request was not ranked very high within the College of Science. We understand that other departments within our College have lost more faculty than we have in recent years, so their needs have to be met immediately. Our needs are longer-term; however, within a faculty hire, in three years our Department will be in the same position currently facing the other Science department. If we are to continue to sustain the quality of our programs, and continue to grow them in the future, we need a tenure-track faculty. (See Appendix I for our 11-12 tenure-track faculty hire request.)

Our future tenure-track faculty hiring requests will focus on Statistical Computation, Large Data Analysis, and Data Analytics. 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 their 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, FERPer) and our staff member make 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 participation in University fundraising events (e.g., Gala), faculty travel to statistics conferences to make poster and other types of presentations, and the outside reviewer expenses for our Five-year Review. We would like to undertake fundraising efforts to increase the size of these
accounts, in order to provide additional financial support to our students. Refer to “3.2 Students” (above) for additional information on the Trust and Leadership accounts as they relate to students.

3.4 Resources

1. We need computer upgrades for all tenured/tenure-track faculty and lecturers. Our faculty currently do not have adequate computer systems access, and this situation has been hindering the development of our curriculum. The unfortunate reality of this year's equipment request process excluding faculty computers has set our currency with computers and software back another year. Our faculty members have resorted to buying their own equipment to support their teaching and research. Hopefully, this situation will change soon; otherwise, we hope their might be an opportunity for our faculty to obtain computer upgrades. Having faculty utilize computers that are not as advanced as the computers in the computer labs makes the investment in computers wasteful, because faculty cannot easily see the capabilities of the computers in the labs.

2. Many of our faculty would like to try using "clickers" in introductory Statistics classes.

3. We need Graduate Coordinator release time in order to handle the advising needs of students enrolled in our growing MS program in Biostatistics.

4. We need the restoration of Chair release time.

5. We need to recover the .75 office staff position that was lost in 2010. It should be noted that when Ms. Cambra was hired to work in our Department in 1972, we had three staff members totaling 2.0 staff positions. At that time, we had so few MS Statistics majors (approximately 10) that our faculty members were concerned about meeting the requirement to graduate five students per year. Departmental records show that we graduated the following number of Statistics majors in 1971-72: MS Statistics – 5, BS Statistics – 5 (total: 10). During 2010-11, with only 1.0 funded staff position, we anticipate graduating the following number of Statistics majors: MS Statistics – 69, MS Biostatistics – 17, BS Statistics – 5 (total: 91). This increase in graduating students underscores the rapid growth in our Department in recent years. At the current time, we estimate having approximately 200 students accepted into all our programs. Our Master's student numbers are far larger than our undergraduate numbers, and a large percentage of our graduate students are International. It takes far more time to handle the Admissions paperwork, advising, graduation processing, and all other aspects of student support for graduate and International students than it does for undergraduates. If we are to continue to provide outstanding service to our students, we need to recover the lost staff position as soon as possible.
The losses sustained by the Department in Summer Quarter 2010 (reduction in Chair release time, transfer of staff member to another department), after 5+ years of major growth in our programs, was announced publicly in a Science Chairs’ meeting. These moves were made to support departments in the College of Science that had experienced losses over the years, and it was mentioned that our Department was over-funded. At the same time, after years of development, our PSM efforts related to our MS program in Biostatistics were not taken into consideration in making the decisions that brought about these changes. As our PSM application clearly stated, we needed Peggy Towers, our part-time staff member, to give a professional front to our new program. We no longer have a staff member who can directly help with the special needs of the students who apply to that program. The loss of a staff member who assisted in attracting and admitting International students has placed a much larger burden on the Department. We do not know how the staff loss will impact, long-term, on admissions to our programs. We will do our best to maintain our programs. Although our MS program in Biostatistics is strong and growing, at the present time we are unable to invest resources to meet some of the requirements of maintaining its PSM status.

4. Outside Reviewer’s Report

This Section 4 (Outside Reviewer’s Report) contains Dr. Bock’s report and lists Dr. Bock’s report page numbers directly above the page numbers of this Departmental report.

See pages 31-40 of this document for the outside reviewer’s report.
I. Introduction

II. National Trends and the CSUEB Statistics and Biostatistics Department
   a. Demand for Statistics Faculty
   b. Service Courses
   c. Degree Programs
      1. Master’s Degrees
      2. Undergraduate Degrees
   d. Statistical Consulting
   e. Research Directions

III. Major Recommendations and Summary
I. Introduction

This external review of the Statistics and Biostatistics Department of California State University, East Bay, is the third in a row for this reviewer and the time span of the reviews has encompassed a period of major growth for both the university and the department (including name changes for both). The materials that form the basis for this review report are a written departmental Self-Study, on-campus interviews held May 26 and 27, 2011, and the previous review report for 2005.

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. (These types of programs as well as the one at CSU East Bay are not subsets of mathematics programs and are different from the kind typically offered through departments of mathematics.) 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.

The department benefits from a collegial atmosphere and the dedication of an extremely competent senior staff member and highly motivated faculty, retired faculty, students and alumni.

The next section of the report describes notable aspects of the program in light of national trends while the last section of the report provides major recommendations and a summary statement.
II. National Trends and the CSUEB Statistics and Biostatistics Department

The topics below are especially pertinent to the CSUEB Department and they are compared with peer experiences in the field.

a. Demand for Statistics Faculty

Even in a dismal economy, colleges and universities across the country continue to fill their precious positions with academic statisticians. (Especially in biotech and data information areas, private industry is a competing employer that continues to demand statisticians with graduate degrees.) These faculty specialists in data analysis are central to the research enterprise in universities today. Furthermore these faculty members supply students with critical experience in the quantitative thinking of the statistical sciences, an integral component of a well rounded education that also enhances student competitiveness in the workplace. This confluence of factors means that the competition for hiring these faculty members is serious.

The department has competed well in the hiring market place to bring in the talented faculty members who arrived since the last review. It is clearly utilizing the attraction of its high quality graduate program, collegial atmosphere and presence in the Bay area. These new faculty members are very impressive and would be welcome in good programs across the country. However, the faculty size is flat since the last review in spite of extraordinary growth in the graduate program. The hire of five new junior faculty members has been offset by the retirement of four senior faculty members (Fearn, Nebenzahl, Orkin and Trumbo) and the departure of a junior faculty member who was present at the last review. Furthermore, another senior faculty member, Norton, has three years remaining in
FERP. There is a serious possibility that the department will lose these new high quality faculty members to other schools or industry if the program continues without augmentation of their ranks and/or an offset of the administrative burden of the program by staff support. (The staff support has actually dropped in the recent past in spite of the major increase in the size of the graduate program that makes it one of the largest in the college.)

Because the department has seen the retirement of most of its senior faculty with their replacement by assistant professors, the success of the enterprise is critically tied to the leadership of the chair. Fortunately he is a visionary professor who has shown amazing talent in steering the junior faculty toward tenure and directing the department in fruitful research and educational directions. (The highly successful transition from the leadership of the previous chair to the current chair is a tribute to the talents of both chairs and the ability of the senior faculty to identify his leadership potential.)

It is distressing to see that no relief time is allocated for the position of chair. The chair’s efforts are essential to the efficiency and growth of the department and are a genuine asset to the College and the University.

b. Service Courses

Service courses in statistics are a growth industry nationally but the number of offerings by the CSU department sits at the same depressed level as in the previous review. A shortage of faculty is behind this but the students of the university are definitely shortchanged due to their lack of exposure to the kind of critical reasoning found in modern statistics courses. Experience in statistical thinking is useful in their personal lives but especially helpful in their professional lives. They are at a competitive disadvantage in the workplace with students who come from schools that offer these courses as a general commodity.
Even the currently offered service courses have unacceptably large class sizes that do not allow for much one-on-one interaction with the instructor. On-line components and distance learning methods can be part of the remedy for the situation but without faculty to direct the offerings, it is not viable. The fact that there are no Teaching Assistantships for department graduate students is another hindrance to meeting demand for service courses.

\textbf{c. Degree Programs}

The department offers the bachelor’s degree, master’s degree and the graduate certificate. The largest number of offerings are at the graduate level and that is consistent with the majority of such departments around the country. Certificate programs at the graduate level are often structured as stepping stones to full-fledged master’s degrees.

1. Master’s Degrees

The program exploits the strong national demand for master’s level statistical scientists by offering a high quality and innovative curriculum. The program offers an impressive number of internships and the graduates are well prepared for further graduate work if they desire.

The current production of master’s degrees for the department is more than triple the original 25 per year in 2004-2005 from the last review. (This is especially amazing in view of the fact that the faculty size has remained flat over this time period.) The current support staff for this very large program has been reduced
recently placing additional burdens on the faculty. While the recent development of the Biostatistics master’s has also contributed to the increase, the Statistics master’s is growing even faster. The current number of master’s students appears to be around 280. The Self-Study indicates that the graduate program offerings in the department are now the largest in the College at this point.

The number of students in the department’s full-time graduate master’s program is especially large with respect to faculty size as compared to other departments in the College of Science. But the size of the part-time master’s program is nearly double the full time and reflects the strong local industry demand. In the Fall 2009, the size of the part-time graduate program was the second largest in absolute value in the College. (This is the latest comparative data that I was able to examine.) Bay area employers often provide support for their employees to take these degrees and the graduates are in demand in data intensive and biotech companies everywhere. Sixty-one students recently taking the master’s exam indicates the strength of the local interest. It is the kind of evidence that supports a build-up of the full-time graduate program through infrastructure and faculty hiring.

The demand for master’s level talent in statistical sciences has had steady growth through many financial cycles. Opportunities for students with these degrees are excellent and the department and the college and the university would benefit with an increase in the growth of the graduate program. It obviously depends on an increase in the faculty/staff size though since the current program is barely sustainable with the current faculty and staff support.

Potential areas of expansion for the master’s program include areas of computational statistics such as analytics, machine learning and data mining of massive data sets. The courses in such a program would enhance the current high quality master’s offerings in biostatistics as well. Like the biostatistics offerings, these new computationally oriented programs would enjoy high demand from employers as well as allow successful transitions to Ph.D. programs. Computer Science students would find that their background is excellent for one of these
kinds of programs. Employers in the Bay area specializing in data analytics and marketing would also be interested in the degree holders.

2. Undergraduate Degrees

Mirroring national trends, East Bay undergraduate statistics degrees awarded are increasing (up to 13 now) with relatively little investment by the department. (This is happening at East Bay even with reduction of actuarial science offerings.) The number of undergraduate majors has grown from 10 to 26 since the last review and some of the 26 are double majors. Statistics majors often are double majors but the difficulty of counting double majors is well recognized. In some schools, the assignment of the double major student goes to the department whose name begins earlier in the alphabet. (This could be countered at East Bay by renaming it the Department of Aardvark and Statistical Sciences.) Separating graduate level and undergraduate level courses has definitely helped both sets of students.

The department’s attempt to grow the BS program through cooperation with community colleges in providing a joint degree path is very promising. Serious growth for the undergraduate program would require additional faculty and staff resources though.

d. Statistical Consulting

Statistics departments have traditionally included a Consulting Program that provides valuable services to the university research enterprise as well a source of potential collaborators for statistics faculty and experience for statistics graduate students who participate as consultants under the direction of a faculty member. The release time needed for faculty to administer such a program is essential. The department continues to search for a viable funding model. Providing opportunities for students to work as members of teams of researchers is a potential alternative learning experience for them.
e. Research Directions

The department has chosen wisely in building up the biostatistics expertise of its faculty through recent hires and the successful development of the master’s in biostatistics.

The most promising area for the future lies in the interface of statistics and computation. It is one of the fastest growing areas of research, yet it is also in the greatest demand from industry and interdisciplinary collaborations. Methodologies for massive data and high dimensional data are central to this area. It has significant applications in bioinformatics as well. Although this was the top-rated area for the previous report it was noted that there were shortages of faculty. These shortages still continue since the Ph.D. production is often scooped up by search engine companies and any kind of group that has massive data. It is notable that the current chair of the department has developed personal expertise in the area and should be an excellent resource if permission to hire is given. Another bonus with a new hire in this area is the possibility of a collaborative appointment in other units such as the College of Business and Economics for analytics, the Department of Engineering or the computer science group in Mathematics for machine learning and massive data.

III. Major Recommendations and Summary

a. Increase the faculty size by five.

The size of the faculty is unusually small for its mission in a university of this size. It cannot meet the demands of its current large high quality graduate program let alone explore the potential for serious growth in
extremely promising areas of analytics, massive data, machine learning and other computationally oriented areas. Furthermore, the university wide educational support for quantitative thinking skills is poorly served by a lack of statistics faculty to teach service courses.

b. Increase the number of service course offerings.

The small number of statistical service course offerings (due to the current small faculty size) is a disservice to the students of the university. Their ability to understand the world around them and to meet the demands of the modern workplace is seriously handicapped without an understanding of the quantitative thinking explored in modern statistics courses. University support should be solicited for this. It has implications for students in all Colleges.

In Summary, this is a very successful program that fills unique needs and its small size is inconsistent with its high quality and mission.
5. Program Response to Outside Reviewer Report

Note: Section 4 (Outside Reviewer’s Report) of this Department report contains Dr. Bock’s report and lists Dr. Bock’s report page numbers directly above the page numbers of the Department report. In this Section 5 (Program Response to Outside Reviewer Report) two page numbers are listed (e.g., 5/35). These page numbers indicate the pages where Dr. Bock’s quotes appear. The first number refers to the page number where the quote appears in Dr. Bock’s original report; the second number refers to the page number where the quote appears in the Departmental report. This same method of listing dual page numbers is used for references to material included in Dr. Bock’s report.

3.1 Curriculum

Service Courses: Dr. Bock correctly explained our “depressed level” of service course offerings as resulting from a shortage of faculty and identified the following problem: “They [students] are at a competitive disadvantage in the workplace with students who come from schools that offer these courses as a general commodity.” (p. 5/35)

Masters’ Degrees (Statistics, Biostatistics): On page 6/36, Dr. Bock commented on the quality of our masters’ programs and mentioned our production of masters’ degrees is “more than triple” what it was during the last review. She remarked: “This is especially amazing in view of the fact that the faculty size has remained flat over this time period … [and] current support staff for this very large program has been reduced recently placing additional burdens on the faculty.” (p. 6-7/36-37) Dr. Bock discussed the Department’s ability to meet the needs of local companies as well as prepare interested students for further graduate work. When discussing possible future growth of the graduate programs to meet increased needs, she wrote: “It obviously depends on an increase in the faculty/staff size though since the current program in barely sustainable with the current faculty and staff support.” (p. 7/37)

Dr. Bock mentioned the following potential areas of expansion for our Statistics Master’s program, which would also enhance our Biostatistics Master’s program: “… analytics, machine learning and data mining of massive data sets.” (p. 7/37) These are areas in which we wish to expand, once we have hired the necessary tenure-track faculty to support this type of program development. As Dr. Bock mentioned, implementing such courses would allow us to continue to meet industry demands as well as better prepare our masters’ students for entry into Ph.D. programs.

Undergraduate Degree (Statistics): Dr. Bock mentioned the growth in our undergraduate majors, accomplished without additional support, and the benefit to separating our graduate- and undergraduate-level major courses through fewer two-tiered course offerings. She felt our recent outreach to community colleges through offering a joint degree path is “promising,” but cautioned: “Serious growth for the undergraduate program would require additional faculty and
3.2 Students

Dr. Bock made the following observations related to our students:

- We need to offer more service courses in order to provide the necessary education for non-Statistics majors entering today’s workforce.

- Our student majors are receiving a quality education that prepares them for jobs in industry and for entry into Ph.D. programs.

- We have successfully adapted to our growing student numbers despite the faculty size being “flat” (no increase in faculty numbers) and a reduction in staff support.

3.3 Faculty

On p. 4/34 of her report, Dr. Bock wrote: “The department has competed well in the hiring market place to bring in the talented faculty members who arrived since the last review.” The new faculty members are: Drs. Lynn Eudey, Sheng-hua (Kelly) Fan, Joshua Kerr, Mitchell Watnik, and YanYan Zhou. As noted by Dr. Bock, while gaining five (5) new faculty members since the last review, we have lost a young faculty member (Dr. Jaimyoung Kwon), hired shortly before the five faculty members listed above, as well as four senior faculty (Drs. Dean Fearn, Elliott Nebenzahl, Michael Orkin, and Bruce Trumbo). Additionally, Dr. Julia Norton has entered the FERP program. As Dr. Bock wrote: “However, the faculty size is flat since the last review in spite of extraordinary growth in the graduate program.” (p. 4/34)

3.4 Resources

Staff and Faculty: On p. 3/33 of her report, Dr. Bock mentioned the following resources: “… the dedication of an extremely competent senior staff member and highly motivated faculty, retired faculty, students and alumni.”

Our staff member, Ann Cambra, has served the Department for over 39 years. She plans to retire within the next few years, and things will not be the same in the Department after she leaves. Having become well acquainted with Ms. Cambra over the last ten years through performing Department reviews, Dr. Bock wrote: “The department benefits from … the dedication of an extremely competent senior staff member….” (p. 3/33) Dr. Bock and our faculty are aware of the loss of production, knowledge, historical information, and skills that will accompany Ms. Cambra’s retirement. The void that accompanies her retirement will be difficult to fill, despite Ms. Cambra’s current focus on preparing the Department for her eventual
departure. Given the continuing State budget crisis, we are concerned that her position will not be filled when she retires. If this is the case, we hope the University will allow her to continue to serve the Department on a part-time basis in the years directly following her retirement.

In Fall Quarter 2011, our FERPing faculty member, Dr. Julia Norton, continues to serve on Department committees; her service on the Department RTP Committee is vital to the well-being of our remaining non-tenured faculty member. Dr. Bruce Trumbo is now fully retired; however, his continuing service to the Department is also vital. He plans to continue to teach Statistics major courses as the needs arises and publish articles with our young faculty and students.

A major Departmental concern about retaining young faculty was expressed by Dr. Bock: “There is a serious possibility that the department will lose these new high quality faculty members … if the program continues without augmentation of their ranks and/or an offset of the administrative burden of the program by staff support.” (p. 5/35) After making this statement, Dr. Bock noted the reduction in staff and alluded to the reduction in administrative (Chair) release time, at a time when the Department was experiencing tremendous growth.

Faculty Research: Dr. Bock mentioned the Department’s success in providing expertise in the field of biostatistics (through faculty hiring and development of the Biostatistics Master’s program). She also mentioned future development needs to relate to the interface of statistics and computation in order to stay current in research and meet industry demand. These are areas in which we wish to expand, once we have hired the necessary tenure-track faculty to support such program development.

Alumni: Dr. Bock mentioned our alumni as a valuable resource. The Department is providing increased information to alumni and students by connection through social media. Additionally, many of our alumni maintain a connection with the Department through hiring our graduating students and making monetary donations to the Department through University Advancement. In the future, we hope to work with a few interested alumni on fundraising.

3.5 Recommendations

- Increase the faculty size by five. This recommendation was made based on the need to offer more service courses; meet the demands of our existing large, high quality graduate programs; and explore the potential for future “… growth in extremely promising areas of analytics, massive data, machine learning and other computationally oriented areas.” (pp. 9-10/39-40) We agree that we need to hire additional tenure-track faculty in order to continue to do the following: stay current in the field of statistics, meet the needs of the private sector, and meet the needs of our students who wish to pursue the Ph.D. We realize that hiring five new faculty members will not be possible in the short-term; however, we hope to pursue this recommendation as a long-term goal.
Increase the number of service course offerings. Dr. Bock makes a strong argument for increasing the number of Statistics service courses offered. She wrote: “Their [the undergraduate students at CSUEB] ability to understand the world around them and to meet the demands of the modern workplace is seriously handicapped without an understanding of the quantitative thinking explored in modern statistics courses.” (p. 10/40) It is extremely difficult to hire qualified Lecturers in the field of statistics, although we continually search for people who can fill these positions. Realistically, In order to offer the number of service courses envisioned by Dr. Bock, we would need to hire additional tenure-track faculty.

NOTE: The Department faculty is making a list of priorities related to Dr. Bock’s recommendations concerning faculty hiring and curriculum.

3.6 Clarifications:

The Department is providing the following clarifications of information contained in Dr. Bock’s report.

- Page 3/33, Dr. Bock wrote: “East Bay is the only one of the California State Universities with a separate statistics or biostatistics department....” Clarification: We are the only CSU campus with a separate Department of Statistics and Biostatistics.

- Page 3/33, Dr. Bock wrote: “… in spite of its relatively small faculty size, the department has the largest graduate program offerings in the College of Science....” Clarification: These numbers fluctuate. However, with our growth over the last five years we have become one of the largest graduate programs in the College and the University.

- Page 5/35: Referring to the Department’s recent graduate program growth, Dr. Bock wrote: “… [this growth] makes it one of the largest in the college.” Clarification: Again, these numbers fluctuate. However, with our growth over the last five years we have one of the largest graduate programs in the College and the University.

- Page 5/35, Dr. Bock wrote: “It is distressing to see that no relief time is allocated for the position of chair.” Clarification: The Chair does receive release time; however, the Chair release time was reduced just prior to our Departmental review. Since Dr. Bock had been discussing the growth in our Department, she was probably referring to the fact that no additional Chair release time accompanied this growth and, in fact, the Chair release time was reduced.

- Page 6/36, Dr. Bock wrote: “The program offers an impressive number of internships....” Clarification: We offer information about jobs and internships, but there is no internship program run through the Department. Although a number of our
students participate in internships, they find their own jobs and handle their own placement.

- Page 7/37, Dr. Bock wrote: “… the graduate program offerings in the department are now the largest in the College at this point.” **Clarification:** Again, these numbers fluctuate. However, with our growth over the last five years we have one of the largest graduate programs in the College and the University.

- Page 8/38, Dr. Bock wrote: Heading: “2. Undergraduate Degrees.” **Clarification:** We have one (1) undergraduate degree (Statistics).

- Page 8/38, Dr. Bock wrote: “In some schools, the assignment of the double major student goes to the department whose name begins earlier in the alphabet.” She then made a humorous suggestion on how we could solve this problem. **Clarification:** At CSUEB the assignment of the double major is not handled alphabetically; rather, the student designates a “first” and “second” major. Generally students add Statistics as their second major, thus we do not receive “credit” for them as our major in University statistical computations.

3.7 Priorities for Next Five Years:
- Maintaining staff
- Maintaining faculty
- Recruiting new tenure-track faculty
- Recruiting students (BS and MS)
- Supporting faculty graduate advising
- Refining curriculum
- 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)
- Assessment (undergraduate service level, graduate level)
- Maintaining bulletin boards for student recruiting

3.8 Summary:

Dr. Bock’s summary statement gives a succinct picture of the Department’s situation: “… this is a very successful program that fills unique needs and its small size is inconsistent with its high quality and mission.” (p. 10/40) Our Department has a history of utilizing limited resources with maximum results. However, Dr. Bock repeatedly mentioned additional faculty and staff funding is essential to the Department’s future efforts to grow and to continue to provide appropriately educated and trained graduates in Statistics and Biostatistics.
The Department of Statistics and Biostatistics is grateful to have benefitted from Dr. Mary Ellen Bock’s expertise over the last ten years and three reviews (approximately 2000-01, 2004-05, 2010-11) in providing valuable input that has led to the growth and development of the Department. We recognize the time and energy it takes to facilitate a useful review and greatly appreciate her outstanding efforts.

Over the next five years, we plan to do our best to follow the priorities identified during this review process. However, our next review will be completed with a new reviewer and a new staff member, as reviewer Dr. Mary Ellen Bock and staff member Ann Cambra will both be retired.

Appendices

There are 11 documents included in this report as Appendices (listed below). Three of the Appendices (E, F, and G) are only available electronically; they are large Excel spreadsheets that could not be converted to a Word document.

A. Application to the Council of Graduate Schools (CGS) for Professional Science Master’s (PSM) Affiliation
B. MS Degree in Statistics
C. MS Degree in Biostatistics
D. BS Degree in Statistics
E. CSUEB Enrollment and FTES
F. CSUEB Overall Enrollment by Ethnicity and Gender
G. CSUEB College Enrollment and FTES
H. CSUEB APR Summary Data 2005-2009
I. 11-12 Tenure-track Faculty Hire Request—New Faculty Justification: Department of Statistics and Biostatistics
J. Virtual Computer Lab Presentation made by Prof. Eric A. Suess at the Back to the Bay Conference Fall 2010 and in Academic Senate Fall 2010
K. Department of Statistics and Biostatistics Scholarships
APPENDIX A

APPLICATION TO THE COUNCIL OF GRADUATE SCHOOLS FOR
PROFESSIONAL SCIENCE MASTER’S AFFILIATION
CALIFORNIA STATE UNIVERSITY, EAST BAY
DEPARTMENT OF STATISTICS AND BIOSTATISTICS

Introduction

California State University, East Bay (CSUEB) and the California State University (CSU) Chancellor’s Office have approved a Master’s degree program in Biostatistics to be offered at CSUEB. The program was developed by the Department of Statistics over five years with 3-years of funding from the SLOAN Foundation. The goal was to obtain approval as a Professional Science Master’s Program. The first year of funding was part of an initial investigation grant; the last two years of funding were part of a CSU system-wide grant. The program was introduced in Fall 2007 by the (concurrently renamed) Department of Statistics and Biostatistics. Modifying the course titles, course descriptions, catalog copy, materials for distribution, and the website has been a continuous process in order to better reflect the professional nature of the Master’s Degree in Biostatistics.

The two approved PSM programs that were closely studied during the development of the CSUEB program are the PSM in Biostatistics at Grand Valley State University (http://www.gvsu.edu/biostat/) and the PSM in Applied Statistics at Penn State University (http://www.stat.psu.edu/grad/degrees/MAS/index.html).

The CSUEB program is a two-year Master’s program designed to prepare students for the dynamic San Francisco Bay Area job market for entry-level Biostatistics-related jobs that focus on the use of SAS, the main technology tool federally mandated by the FDA for clinical trials research reporting and used in most clinical trials research. The industry sectors include (but are not limited to) pharmaceutical, biomedical, public health, and academia.

The CSUEB program is now in its second year. Already some students have graduated with the MS Degree in Biostatistics; additionally, over 22 students enrolled in the program Fall Quarter 2008. The program has heavily incorporated the use of SAS software and the most common SAS procedures for implementing clinical trials, which prepares students to apply for master’s-level jobs in the field of Biostatistics, such as SAS Programmer positions. The final course in the Biostatistics sequence is on Clinical Trials. This course requires students to work in groups to understand how master’s-level biostatisticians fit into the research and reporting processes.
The Biostatistics program can be completed by attending classes two nights a week, after 4:00 p.m., for two years. The program requires completion of twelve 4-unit courses, for a total of 48 quarter units. We believe CSUEB has an advantage being on the Quarter System in developing the PSM program because of the larger number of courses we can offer on specific topics that enhance the students’ preparation for employment in the Biostatistics field. The quarter system also is very well suited for working professionals who want to participate as students in the program.

In this proposal to the Council of Graduate Schools, we wish to apply for a Professional Science Master Affiliation for the program. The specific guidelines for PSM designation are addressed below.

1. **Curriculum**

The curriculum was designed to enhance the Master’s program in Statistics, allowing students to specialize their studies to meet the needs of the growing field of Biostatistics. The newly-introduced curriculum includes plus courses on SAS programming, Clinical Trials for the Pharmaceutical and Biomedical Industries, Categorical Data Analysis for Biostatistics, and Survival Analysis for Biostatistics. The new program is applied in nature. The curriculum integrates specific applied data analysis skills, to further incorporate the instruction of industry standard business technology tools (SAS, R, Minitab, MS Excel, MS Word) for data management and reporting in the curriculum. The curriculum also focuses the students’ attention on industry-specific knowledge and skills necessary for employment. The program offers a capstone course on Clinical Trials that includes a collaborative project involving students in studying how clinical trials are conducted and how master’s-level biostatisticians participate in the process.

The program requires a two-part comprehensive examination covering all of the required courses in the program. The closed book portion covers the knowledge of the models presented in the program, including topics likely to be discussed in job interviews. The open book portion covers the implementation of models presented in the program. The open book portion of the examination is administered in a computer laboratory using computer software; it is designed to reflect a potential work environment in a business setting.

The curriculum for the current program is listed below, along with the specific software packages integrated into each required course. The course listing incorporates new changes that are being prepared for approval this academic year.
Degree Requirements

Course Requirements (48 units)
Additional courses referred to in section # 3 below must be approved in writing in advance by an advisor.

1. Required First Year Courses (24 units)
   STAT 6204 Probability Theory (4) <<< R >>>
   STAT 6205 Statistical Theory (4) <<< R >>>
   STAT 6250 SAS Programming (4) <<< SAS, MS Excel, MS Word >>>
   STAT 6304 Advanced Statistical Inference (4) <<< Minitab, MS Word >>>
   STAT 6305 Analysis of Variance Models (4) <<< Minitab or SAS, MS Word >>>
   STAT 6509 Theory and Application of Regression (4) <<< SAS, MS Word >>>

   Students entering the program with acceptable credit for any of these courses (or equivalents) will select additional courses from approved graduate-level coursework, section # 3 below, or courses from other departments designated as acceptable by a graduate advisor.

2. Required Second Year Courses (24 units)
   BSTA 6651 Analysis of Categorical Data in Biostatistics (4) <<< SAS >>>
   BSTA 6652 Survival Analysis in Biostatistics (4) <<< SAS >>>
   BSTA 6653 Clinical Trials in the Pharmaceutical and Biomedical Industries (4) <<< SAS, MS Word >>>
   STAT 6501 Mathematical Statistics I (4) <<< R >>>
   STAT 6502 Mathematical Statistics II (4) <<< R >>>

   Select one course from the following:
   BSTA 6690 Statistical Bioinformatics (4)
   STAT 6401 Advanced Probability I (4)

3. Additional Courses
   Students with department approval can select courses in Biostatistics, Biological Sciences, Business, Computer Science, Mathematics, Regulatory Affairs, or Statistics. A partial list of courses is given below:

   BIOL 3410 Epidemiology (4)
   BSTA 6690 Statistical Bioinformatics (4)
   BSTA 6841-6849 Selected Topics in Biostatistics (4)
   STAT 6310 Advanced Stochastic Processes and Simulation (4)
   STAT 6401 Advanced Probability I (4)
   STAT 6402 Advanced Probability II (4)
   STAT 6515 Advanced Multivariate Analysis (4)
   STAT 6550 Bayesian Statistics (4)
   STAT 6555 Statistical Time Series Analysis (4)
   STAT 6601 Advanced Statistical Computing (4)
   STAT 6860-6864 Selected Topics in Graduate Probability and Statistics (4)
   STAT 6898 Co-operative Education (1-4)
   STAT 6900 Independent Study (1-4)
   MATH 3100 Linear Algebra (4)
   MATH 3300 Analysis I (4)
   MGMT 6550 Research Methods and Communications (4)

   The Center for Bio/Pharmaceutical and Biodevice Development at San Diego State University provides distance learning courses in Regulatory Affairs. The following courses have been selected as possible additional courses that would enhance the professionalism of the Biostatistics PSM program.

   SDSU RA 601 The Pharmaceutical, Biotechnology and Medical Device Industries (3 semester units)
   SDSU RA 602 Introduction to Food and Drug Law (3 semester units)
   SDSU RA 605 Medical/Scientific Writing For Healthcare Professionals (3 semester units)
New Course descriptions approved by the Department Curriculum Committee Fall 2008. Changes have been made to better reflect the emphasis on methods related to the Biostatistics field, to show the incorporation of SAS in the core curriculum, and to show that ethical consideration related to the use of data is incorporated across the curriculum.

6250 SAS Programming (4)

6651 Analysis of Categorical Data in Biostatistics (4)

6652 Survival Analysis in Biostatistics (4)

6653 Clinical Trials in the Pharmaceutical and Biomedical Industries (4)
Table 1: Roadmap for the Masters of Science Program in Biostatistics

M.S. Program in Biostatistics

<table>
<thead>
<tr>
<th>First Year</th>
<th>Second Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td><strong>Winter</strong></td>
</tr>
<tr>
<td>STAT 6204</td>
<td>STAT 6501</td>
</tr>
<tr>
<td>Probability</td>
<td>Mathematical</td>
</tr>
<tr>
<td>Theory (4)</td>
<td>Statistics I (4)</td>
</tr>
<tr>
<td>STAT 6304</td>
<td>STAT 6502</td>
</tr>
<tr>
<td>Advanced</td>
<td>Mathematical</td>
</tr>
<tr>
<td>Statistical</td>
<td>Statistics II (4)</td>
</tr>
<tr>
<td>Inference (4)</td>
<td>(4)</td>
</tr>
<tr>
<td>STAT 6205</td>
<td>STAT 6651</td>
</tr>
<tr>
<td>Statistical</td>
<td>Categorical</td>
</tr>
<tr>
<td>Theory (4)</td>
<td>Data in Biostatistics (4)</td>
</tr>
<tr>
<td></td>
<td>(4)</td>
</tr>
</tbody>
</table>

2. Credit Hours

The program consists of 48 quarter units of first-year foundation courses in Statistics and advanced, second-year, courses that develop the necessary understanding of the methods used most frequently in clinical trials research in industry. The Department created four new courses for this program with input from alumni, business professionals, members of the Bay Area American Statistical Association (ASA), and newly-hired faculty. (The Department hired six new faculty members over a four-year time period [2004-2007]. Three of the new faculty members were hired with specific expertise in Biostatistics in order to make offering this program possible. Industry experience was a selection criterion.) The most important newly-developed course is SAS Programming, which presents the use of SAS; this is the main business skill added to the program. SAS has also been incorporated extensively into the two main methods classes for Biostatistics. We are currently working to incorporate relevant SAS usage into the Clinical Trials class related to the design of clinical trials.

The CSU requires a writing skills test prior to graduation. In order to maximize this opportunity, we advise our students who need to take a writing class to take the business writing or technical writing class to complete this requirement.
3. Quality Assurance

CSUEB is centrally located in the San Francisco Bay Area, close to the primary companies in the pharmaceutical and biomedical industries. The Department of Statistics and Biostatistics (formally Department of Statistics) has a more than 40 year history of preparing master’s-level students for the Bay Area job market and beyond. Many of the alumni have stayed in the area, and many have hired later graduates of the program. Building on the constant feedback and suggestions from alumni, the programs have been modified to better fit the needs of local industry.

The programs offered through the Department of Statistics and Biostatistics have always attracted and graduated a diverse collection of students. In recent years, the graduating classes have been comprised of approximately 50% (or more) women.

The CSUEB Master’s of Biostatistics program is administrated as a "state-side" program supported by the University's state-funded budget. Those teaching courses for the Biostatistics curriculum are mostly tenured or tenure-track faculty members who are subject to the same faculty governance review as all other graduate programs offered at CSUEB. The SAS Programming course is sometime taught by industry professionals with experience using SAS for clinical trials research. The Biostatistics program is subject to similar standard program review, annual metrics of program efficiency and effectiveness.

The following tenure-track faculty and lecturers are involved in the delivery of the curriculum:
Eric A. Suess, Chair, Associate Professor, PSM Program Director
Julia Norton, Professor
Bruce E. Trumbo, Professor Emeriti
Lynn Eudey, Assistant Professor (for Biostatistics, 5+ years’ professional experience in the pharmaceutical industry)
Shenghua Fan, Assistant Professor (for Biostatistics)
YanYan Zhou, Assistant Professor (for Biostatistics, 2+ years’ professional experience in the pharmaceutical industry)
Joshua D. Kerr, Assistant Professor
Jaimyoung Kwon, Assistant Professor
Mitchell R. Watnik, Assistant Professor
Clyde Sugahara, Lecturer
Jesse Canchola, Siemens, formally UCSF (for Biostatistics, 10+ years professional experience in the pharmaceutical industry)

4. Advisory Board
The San Francisco Bay Area is a center for the pharmaceutical and biomedical companies that hire master’s-level Biostatistics students with strong SAS programming skills. The Department of Statistics and Biostatistics has a long standing connection to the American Statistical Association’s local Bay Area Chapter. We regularly host chapter gatherings and quarterly seminars on campus; those who present talks at, and many who attend, these seminars are members of local industry. Department faculty members regularly serve as ASA chapter officers, which puts them in direct contact with members of industry. As part of our program development, we have included ASA chapter members in our industry surveys.

The Department of Statistics and Biostatistics has formed a closer working relationship with the new President of the Bay Area SAS User Group (BASAS). We have long encouraged students to become members of BASAS, and will continue to do so. This is the only independent SAS user group nationwide. In order to keep current with new developments with SAS and its use in Clinical Trials research, we have begun (and plan to continue) to have regular reviews of our SAS curriculum by members of BASAS.

The Department of Statistics and Biostatistics has formed a closer working relationship with our SAS Institute (www.sas.edu) educational outreach representative. We have incorporated the SAS job network website into our list of relevant job search websites; this information is provided to students and alumni.

We include some former students as members of our advisory board, mainly those who work in these industries and have continued to maintain contact with the faculty. These former students offer valuable feedback about employer needs and employee skills necessary to be competitive in the job market. The members of the board have contributed extensively to the curriculum development and suggested the SAS programming skills now incorporated into the courses we have added to the Biostatistics program.

Over the last several years, the Department has hosted an annual Statistics Research Day (now called the Statistics/Biostatistics Research Day). The industrial advisory board members have assisted with this event. The Research Day focuses on the use of statistics in industry. This all-day event allows current students to learn about the application of their subject in industry, as presented by working professionals, alumni, and current students who are working in the field. Students are encouraged to submit their resumes at Research Day; these resumes are presented to the industry representatives for their feedback. Current students have the opportunity to make valuable industry connections at the Research Day.

Because of the input received from members of the advisory board, graduates of our program are better prepared to enter the work force to perform the needed data analyses for clinical trials research in the Biotechnology industry.

5. Professional Component

The Department website is the most important tool for attracting and recruiting applicants to our program. We have done our best to develop and improve the materials describing our program.
Students are encouraged to attend Fall Orientation meetings. Each Fall Quarter separate sessions are offered for first- and second-year students. During these orientations, the requirements of the program are discussed. At the time students enter the program, emphasis is placed on thinking about applying to jobs and preparing a resume. Many of our students find jobs in the field before graduation.

The most important new professional course in the program is the SAS Programming course, STAT 6250. This course was developed over the last five years under the CSU/Alfred P. Sloan Foundation grant. This course was developed to cover the professional topics in data management and SAS programming. The topics covered are those that could lead to passing the base SAS Programming Certification Exam and/or the advanced SAS Programming Certification Exam. These are professional certification exams that are often taken by programmers who do not have a degree in Biostatistics. Passing these exams is not a requirement for employment as a master’s-level Biostatistician, but the knowledge is required and presented in our Biostatistics program throughout the curriculum.

The other main courses that have been developed are: Categorical Data Analysis in Biostatistics, BSTA 6651, and Survival Analysis in Biostatistics, BSTA 6652. Each of these courses was developed with extensive input from the newly-hired faculty in the field of Biostatistics and input from those working within the industry. Each course includes extensive use of SAS for the data management and data analysis. Ideas related to issues of ethical use of data, patient privacy, and objectivity are integrated into all of the required courses; however, these ideas are primary topics of discussion in BSTA 6653, Clinical Trials for the Pharmaceutical and Biomedical Industries.

The members of the advisory board are regularly encouraged to send job descriptions to the Department for publicizing to our current students. We utilize these industry connections as part of our active job recruitment efforts on behalf of our students. Most of our current MS Biostatistics students are already employed in industry and are interested in career advancement. Many of these students have access to educational funds provided by their company, which helps defray the cost of their education.

6. Current Student and Alumni Assessment

The Department has been highly successful in recruiting and admitting students, in large part because of the hard work our part-time staff member, Peggy Towers. Ms. Towers was hired approximately 3.5 years ago, soon after our last Departmental Academic Five-Year Review report recommended filling a vacant staff position (the vacancy resulted from a previous State budget crisis). The Reviewer offered some valuable ideas concerning restructuring the duties related to this staff position, ideas that centered on applicant admissions and student-related issues. With a rapid increase in student numbers, and bearing in mind the Reviewer’s comments, the Department has enhanced its application follow-through while streamlining the admissions process. The faculty members believe Ms. Towers’ dedication, skills, and efficiency are an essential element in the rapid growth in number of students admitted to the Department. In fact,
faculty believe Ms. Towers’ interaction with applicants/students is a primary reason for the current success of the MS program in Biostatistics.

The Department of Statistics and Biostatistics offers separate first- and second-year Fall Orientation sessions to advise students about the program, to help focus students’ preparation for starting a career, and to encourage students to continue their contact with the Department after graduation.

Current students are encouraged to join relevant professional organizations such as the American Statistical Association and the Bay Area SAS Users Group.

Current students are encouraged to make use of the list of job posting websites and links (such as www.bajobs.com or www.sanfranjobs.com or support.sas.com/learn/ap/student/network.html) long before they graduate and begin their job search. Students are encouraged to prepare their resume before the Spring Break of the second year of classes.

Alumni are encouraged to send job announcements to the Department. These are promptly emailed to current students. We try to follow up with alumni who hire our current graduates to see how our program can be modified to better prepare students for careers in industry.

The Department tries to encourage students to join the online network LinkedIn (www.linkedin.com) in order to network with other current students and past graduates of the program. This has allowed easy communication with former graduates about issues related to our program.

The Department has developed suggested guidelines for faculty asked to provide professional references for current students and alumni. It is suggested that faculty clearly describe our MS program as an applied, professionally-oriented program that focuses on industry relevant topics and software skills. Providing references has proven to be one of the best recruiting tools for informing appropriate (e.g., industry-related) people throughout the Bay Area about our new MS program in Biostatistics.

Each year, members of the Department faculty monitor student performance on the MS Examination to assess consistency and the relevance of each test. New exams are written and administered during the Fall and Spring quarters of each academic year.

7. Branding

California State University is the largest statewide higher education system in the nation to launch the Professional Science Master's Degree program on multiple campuses. Under the leadership of Dr. Keith Boyum, Associate Vice Chancellor, Academic Affairs, the CSU Chancellor’s Office has implemented a senior administrative staff team to assist campus-based program development and system-level implementation. A CSU PSM website has been established to facilitate communication among campus program leaders and outreach to industry, government partners, and potential students. In addition, the Chancellor’s Office established a
California PSM Statewide Advisory Board that includes top campus administrators and industry and state government leaders.

The CSUEB Department of Statistics and Biostatistics has been working to incorporate the Professional Science Master’s designation and logo on our new web pages describing the program. Assuming our program is approved as a PSM program, we hope to post these soon. We are very excited about the future prospects for the visibility of our program and for the connection to other high quality MS programs nationwide.

For additional information, please contact:

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Department of Statistics and Biostatistics
Director Professional Science Master’s Program in Biostatistics
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Hayward, CA  94542
Phone: 510-885-3435
Email: eric.suess@csueastbay.edu

Summary of new integrated components in the MS Biostatistics program

- Program orientation and advisement
- Honesty in data collection
- Data integrity
- Objectivity in data analysis
- Report writing
- Regulatory requirements
- SAS programming skills
- Development of career objectives
- Development of a professional network
- Effective use of online networking
- Where to look for job postings online
- Resume preparation
- Alumni connections
APPENDIX B

MS DEGREE IN STATISTICS
DEPARTMENT OF STATISTICS AND BIOSTATISTICS
Spring 2011

As set forth in the mission statement and the goals and objectives for the programs in Statistics, the objectives and specific competencies listed below constitute the learning objectives for the MS degree program in Statistics at CSUEB. All courses are expected to address a specific and overlapping subset of these overall objectives and to develop specific competencies as required for entry-level statisticians working in the field of statistics.

Overall Objectives for the MS in Statistics
1. To appreciate the basics of modeling and error analysis, particularly those enhanced by the use of cutting-edge computer technology and the most modern computer-intensive statistical methods.
2. To carry out accurate and careful statistical analyses of real world problems and to express these analyses as the meaningful oral and written communication of statistical ideas.
3. To experience working in teams and to receive cordial, meaningful, and persistent advising appropriate to the students' career goals.
4. To develop an appreciation of the ethical and legal issues involved in the collection and dissemination of statistical information and experimental design.

Specific Competencies
Skill in:
1. Using current computer technology for collecting, cleaning, and managing data, exploratory data analysis and the graphical display of data, inference and simulation studies.
2. Applying statistical theory, methodology and probability modeling to real world problems.
3. Critically evaluating the uses of statistics as they relate to experimental design, including the ability to identify appropriate applications and deceptive or erroneous reasoning.
4. Simulating probabilistic outcomes to assess theories appropriate to real-life examples or hypothetical situations.
5. Effective communication of statistical concepts and inferential results to both statisticians and non-statisticians.
6. Reading and understanding articles in professional statistics journals and the ability to apply new methodology from such articles.
**Pedagogy/Best Practices**
We undertake the following as useful pedagogical strategies to be encouraged in the achievement of the objectives:

1. Faculty teaching statistics courses are committed to meeting the above listed objectives for all students.
2. The statistics MS degree incorporates material and assignments with relevance to students' lives, experiences, and future employment, including real world topics and applications.
3. The statistics MS degree offers several options designed to customize the student’s education to his/her specific career goals:
   a. Applied Statistics
   b. Computational Statistics
   c. Mathematical Statistics
   d. Actuarial Science
4. Statistics course materials are presented in a variety of accessible ways that are understandable to students (e.g., lecture, small group and individual problem-solving, everyday applications, projects).
5. The contributions, experiences, and perspectives of various cultural groups are incorporated into the statistics courses, when appropriate.
6. Learning in statistics is viewed as part of a developmental continuum, and students are given instruction and support appropriate to their individual developmental needs.
7. Department and/or institutional support and advising are provided for students at risk for not completing the MS requirements in statistics.
8. Department scholarships provide support to exceptionally well performing students.

**Assessment Tools**
Skills are introduced, reinforced, emphasized and tested throughout the statistics MS degree. Students earning the MS degree in statistics must meet specific course requirements and complete a comprehensive MS examination in statistics.

1. A capstone experience of a two-quarter course, STAT 6501/6502 “Mathematical Statistics I/II,” must be completed by all statistics MS students. This course provides the students with the necessary knowledge and tools to continue to learn new and apply new methodology in their careers as statisticians.
2. Students must pass the comprehensive MS examination in Statistics. Students are required to complete the majority of their master's level program before taking these exams. The exams comprise two parts:
   a. A closed book exam, covering probability, theoretical and applied statistics, designed to measure their comprehension of and ability to apply the skills in 1-6 above. This measure permits the evaluation of the student's understanding of theoretical statistics and probability.
   b. An open book examination, requiring the use of statistical programming packages designed to measure the student's ability to apply the methodology of statistics and the skills in 1-6 above. This exam is designed to test the hands-on application of the
skills utilizing currently used computer technology.

**Departmental Support**
We offer appropriate and necessary support for students to complete the Statistics MS requirements, including:

1. Advising to ensure that students select courses appropriate to their needs, interests, and preparation.
2. An adequate number and variety of approved courses each quarter with a variety of instructors over time.
3. Periodic review of courses for frequency of offering (at least once a year), number of sections, variety of perspectives represented, and achievement of departmental objectives (at least at the five-year-review).
4. Active intervention for students identified as at risk of not completing the requirements.
5. Previous comprehensive exams (and solutions) are posted on a Blackboard webpage accessible to statistics’ majors.
6. Where appropriate, the Department of Statistics and Biostatistics will assist students and graduates to meet their goals of applying and attending advanced graduate programs in Statistics or other allied fields. We will advise and provide letters reflecting the character of their work in the programs of the Department of Statistics and Biostatistics.
7. Students can apply for five annually given Department scholarships ($500+ one-time award) awarded to our exceptional students.

**Student Preparation**
Students entering the MS degree program in statistics must complete a foundation of coursework in mathematics through three-quarters of calculus and an introduction to linear algebra. Deficiencies in calculus are noted prior to entry, and students are encouraged to repeat calculus and/or the required background courses if necessary before entry to the program. Normally an introductory course in probability and one in statistics must be completed before entry. Flexible entry points are allowed for students coming from a variety of backgrounds who have completed the minimum requirements.

**Attachments:**
1. MS in Statistics “Roadmap” outlining course requirements over a 2-year period
2. Syllabus for STAT 6501 “Mathematical Statistics I”
# M.S. Program in Statistics

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<tbody>
<tr>
<td><strong>First Year</strong></td>
<td>STAT 6204 Probability Theory (4)</td>
<td>STAT 6205 Statistical Theory (4)</td>
<td>STAT 6310 Stochastic Processes (4)</td>
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<td>STAT 6304 Advanced Statistical Inference (4)</td>
<td>STAT 6305 Analysis of Variance Models (4)</td>
<td>STAT 6509 Theory and Application of Regression (4)</td>
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<td><strong>Second Year</strong></td>
<td>STAT 6401 Advanced Probability I (4) ME (4)</td>
<td>STAT 6501 Mathematical Statistics I (4) ME (4)</td>
<td>STAT 6502 Mathematical Statistics II (4) ME (4)</td>
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<tr>
<td>ME – Major Elective</td>
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</table>
Lecture: Sec. 1, MW 2-3:50, Sec. 2, 6-7:50, ScN207

Instructor: Prof. Eric A. Suess  Office: NSc 229  Phone: 885-3879  e-mail: eric.suess@csueastbay.edu

Office Hours: MW 1-2pm, 5-6pm or by appointment

Class Web-page: http://www.sci.csueastbay.edu/~esuess/

Required Texts:

References:

Material To Be Covered: The main topics to be covered in the 6501 and 6502 sequence are Limit Theorems, Estimation, Confidence Intervals, Hypothesis Testing, Bootstrapping and Bayesian Estimation. Before we engage in the study of these topics we will review some probability and statistics topics, such as random variables, joint distributions, expectation and others.

Computers: We will use the R statistical language to demonstrate and apply many of the ideas in the course. R code will be given in class and you will be given assignments related to these examples.

Homework: The material in this course can only be learned through working many problems. Most of the homework assigned during the course will be graded for content and clarity. Comments will be made and graded problems submitted that need further work should be re-submitted for a final grading.

Grading:
- Homework 30%
- Quizzes 10%
- Midterm 30%
- Final 30%

Policy on Make-up Exams: You are expected to take the quizzes and exams at the scheduled times. In case of genuine emergency, illness or hardship, for which you can present written documentation I may agree to arrange for a make-up exam. Make-up exams must always be arranged BEFORE the regular exam is given and always take place AFTER the regular exam. Quizzes may not be made up!
Lecture: Sec. 1 MW 2-3:50, Sec. 2 6-7:50, ScN207

Instructor: Prof. Eric A. Suess  Office: NSc 229  Phone: 885-3879  e-mail: eric.suess@csueastbay.edu

Office Hours: MW 1-2pm, 5-6pm or by appointment

Class Web-page: http://www.sci.csueastbay.edu/~esuess/

Required Texts:

References:
- Casella and Berger, Statistical Inference, Duxbury 1990.

Material To Be Covered: The main topics to be covered in the 6502 are Estimation and Hypothesis Testing.

Computers: We will use the R statistical language to demonstrate and apply many of the ideas in the course. R code will be given in class and you will be given assignments related to these examples.

Homework: The material in this course can only be learned through working many problems. Most of the homework assigned during the course will be graded for content and clarity. Comments will be made and graded problems submitted that need further work should be re-submitted for a final grading.

Grading:
- Homework 30%
- Quizzes 10%
- Midterm 30%
- Final 30%

Policy on Make-up Exams: You are expected to take the quizzes and exams at the scheduled times. In case of genuine emergency, illness or hardship, for which you can present written documentation I may agree to arrange for a make-up exam. Make-up exams must always be arranged BEFORE the regular exam is given and always take place AFTER the regular exam. Quizzes may not be made up!
APPENDIX C

MS DEGREE IN BIOSTATISTICS
DEPARTMENT OF STATISTICS AND BIOSTATISTICS
Spring 2011

As set forth in the mission statement and the goals and objectives for the programs in Statistics and Biostatistics, the objectives and specific competencies listed below constitute the learning objectives for the MS degree program in Biostatistics at CSUEB. All courses are expected to address a specific and overlapping subset of these overall objectives and to develop specific competencies as required for entry-level biostatisticians.

Overall Objectives for the MS in Biostatistics

1. To appreciate the basics of modeling and error analysis, particularly those enhanced by the use of currently used computer technology and the most modern computer-intensive statistical methods.
2. To carry out accurate and careful statistical analyses of real world problems and to express these analyses as the meaningful oral and written communication of statistical ideas specifically in biostatistics.
3. To experience working in teams and to receive cordial, meaningful, and persistent advising appropriate to the students’ career goals.
4. To develop an appreciation of the ethical and legal issues involved in the collection and dissemination of biostatistical information and experimental design.

Specific Competencies

Skill in:

1. Use of current computer technology for collecting, cleaning, and managing data, exploratory data analysis and the graphical display of data, inference and simulation studies.
2. Specific application of data analysis skills, using industry standard business technology tools (SAS, R, Minitab, MS Excel, MS Word) for data management and reporting in the curriculum.
3. Applying statistical theory, methodology and probability modeling to real world problems encountered in industry sectors including (but not limited to) pharmaceutical, biotechnology, medical, public health and in academia.
4. Critically evaluating the uses of statistics as they relate to experimental design, including the ability to identify appropriate applications and deceptive or erroneous reasoning.
5. Simulating probabilistic outcomes to assess theories appropriate to real-life examples or hypothetical situations.
6. Effective communication of statistical concepts and inferential results to both statisticians and non-statisticians.
7. Reading and understanding articles in professional statistics/biostatistics journals and the ability to apply new methodology from such articles.
**Pedagogy/Best Practices**

We undertake the following as useful pedagogical strategies to be encouraged in the achievement of the objectives:

1. Faculty teaching biostatistics courses are committed to meeting the above listed objectives for all students.
2. The biostatistics MS degree incorporates material and assignments with relevance to students' lives, experiences, and future employment, including real world topics and applications.
3. The biostatistics MS degree offers four courses dedicated to specific tools and practices in the field of biostatistics:
   a. STAT 6250 SAS Programming
   b. BSTA 6651 Analysis of Categorical Data in Biostatistics
   c. BSTA 6652 Survival Analysis in Biostatistics
   d. BSTA 6653 Clinical Trials in Pharmaceutical and Biomedical Industries
4. Statistics/biostatistics course materials are presented in a variety of accessible ways that are understandable to students (e.g., lecture, small group and individual problem-solving, everyday applications, projects).
5. The contributions, experiences, and perspectives of various cultural groups are incorporated into the statistics/biostatistics courses, when appropriate.
6. Learning in statistics/biostatistics is viewed as part of a developmental continuum, and students are given instruction and support appropriate to their individual developmental needs.
7. Department and/or institutional support and advising are provided for students at risk for not completing the MS requirements in biostatistics.
8. Department scholarships provide support to exceptionally well performing students.

**Assessment Tools**

Skills are introduced, reinforced, emphasized and tested throughout the biostatistics MS degree. Students earning the MS degree in biostatistics must meet specific course requirements and complete a comprehensive MS examination in statistics/biostatistics.

1. At the end of the second year all students in the biostatistics MS program take a capstone experience of one quarter course, BSTA 6653 “Clinical Trials in the Pharmaceutical and Biomedical Industries.” This course incorporates the tools learned in the previous core courses, introduces design of clinical trials. In addition, the students are exposed to the regulatory environment of biomedical industries and to the ethical considerations of collection and use of data, patient privacy, and objectivity of analysis. The requirements include a collaborative project in which students are required to give a professional presentation (either a poster or a short presentation) on a clinical trial.
2. Students must pass the comprehensive MS examination in statistics/biostatistics. Students are required to complete the majority of their master's level program before taking these exams. The exams comprise two parts:
a. A closed book exam, covering probability, theoretical and applied statistics, designed to measure their comprehension of and ability to apply the skills in 1-7 above. This measure permits the evaluation of the student's understanding of theoretical statistics and probability.

b. An open book examination, requiring the use of statistical programming packages (specifically SAS®) designed to measure the student's ability to apply the methodology of biostatistics and the skills in 1-7 above. This exam is designed to test the hands-on application of the skills utilizing currently used computer technology. The open book examination tests the students on the methodology courses including categorical data analysis and survival analysis.

Departmental Support
We offer appropriate and necessary support for students to complete the Biostatistics MS requirements, including:

1. Advising to ensure that students select courses appropriate to their needs, interests, and preparation.
2. Periodic review of courses for frequency of offering (at least once a year), number of sections, variety of perspectives represented, and achievement of departmental objectives (at least at the five-year-review).
3. Active intervention for students identified as at risk of not completing the requirements.
4. Previous comprehensive exams (and solutions) are posted on a Blackboard webpage accessible to biostatistics’ majors.
5. Where appropriate, the Department of Statistics and Biostatistics will assist students and graduates to meet their goals of applying and attending advanced graduate programs in Biostatistics or other allied fields. We will advise and provide letters reflecting the character of their work in the programs of the Department of Statistics and Biostatistics.
6. Students can apply for five annually given Department scholarships ($500+ one-time award) awarded to our exceptional students.

Student Preparation
Students entering the MS degree program in biostatistics must complete a foundation of coursework in mathematics through three-quarters of calculus and an introduction to linear algebra. Deficiencies in calculus are noted prior to entry, and students are encouraged to repeat calculus and/or the required background courses if necessary before entry to the program. Normally an introductory course in probability and one in statistics must be completed before entry. Flexible entry points are allowed for students coming from a variety of backgrounds who have completed the minimum requirements.

Attachments:
1. MS in Biostatistics “Roadmap” outlining course requirements over a 2-year period
2. Syllabi for BSTA 6653 “Clinical Trials in Pharmaceutical and Biomedical Industries”
3. Project requirements for BSTA 6653
# M.S. Program in Biostatistics

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<tr>
<th>FIRST YEAR</th>
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<tr>
<td>STAT 6204 Probability Theory (4)</td>
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<tr>
<td>STAT 6304 Advanced Statistical Inference (4)</td>
<td>STAT 6305 Analysis of Variance Models (4)</td>
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<tr>
<td>STAT 6401 Advanced Probability I (4)</td>
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<td>STAT 6502 Mathematical Statistics II (4)</td>
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</tr>
<tr>
<td>BSTA 6651 Categorical Data (4)</td>
<td>BSTA 6652 Survival Analysis (4)</td>
<td>BSTA 6653 Clinical Trials (4)</td>
<td></td>
</tr>
</tbody>
</table>
Biostatistics 6653 – Clinical Trials  
California State University East, Hayward  
Spring 2011

Lecture: Monday and Wednesday 4 – 5:50 p.m. Sc N207  
Instructor: Lynn Eudey  
Office: Sc N 303-A  
Phone: 510.885.3617  
e-mail: lynn.eudey@csueastbay.edu  
Stat Office: Sc N 229  
Phone: 510.885.3435

Office hours: M, W 9 – 9:35 a.m. and 12:40 – 1:20 p.m. or by appointment.  
Use of e-mail is encouraged.

Prerequisite: Biostatistics 6652

Course Objectives: This course will provide an introduction to the design of medical trials with emphasis on randomized, controlled clinical trials.

Required Textbooks:

Reference:
- Clinical Trials, Pocock (1984), Wiley.

Homework and Projects:
- Homework will be assigned regularly and will be due the following Monday
- Short projects will be assigned
- Late homework and projects will not be accepted

Quizzes:
- Short, roughly 20 minutes long
- Given 3 – 5 times during the quarter
- No makeup quizzes

Midterm:
- One midterm

Grading:
- HW & Projects: 35%
- Quizzes: 20%
- Midterm: 20%
- Final: 25% (comprehensive)

Policy on Make-up Tests: No make-up projects or quizzes. Make-up midterm may be allowed given a genuine emergency, illness, or other hardship; written documentation must be provided. Make-up midterm must be arranged before the midterm time and will be given after the mid-term time. Make-up midterm will cover the same material but may be a different test.
Housekeeping: Please arrive on time both at the beginning of class and after break. If you have to be late please enter quietly and catch-up after lecture. Please turn off all electronic devices such as pagers, cell phones, etc. A five minute break will be given at roughly 5 p.m.

UNIVERSITY POLICIES FOR INCLUSION ON SYLLABI

Emergency Information
California State University, East Bay is committed to being a safe and caring community. Your appropriate response in the event of an emergency can help save lives. Information on what to do in an emergency situation (earthquake, electrical outage, fire, extreme heat, severe storm, hazardous materials, terrorist attack) may be found at:
http://www.aba.csueastbay.edu/EHS/emergency_mgnt.htm
Please be familiar with these procedures. Information on this page is updated as required. Please review the information on a regular basis.

Policy on Academic Dishonesty:
The University has a published policy on cheating and academic dishonesty. Students are expected to be familiar with the policy and to abide by it. Cheating will result in: 1) a zero score on the test and the loss of all grading options; and/or 2) an "F" grade for the course; and/or 3) referral to the Academic Vice President for expulsion from the University.

Accommodations for Students with Disabilities:
If you have a documented disability and wish to discuss academic accommodations, or if you would need assistance in the event of an emergency evacuation, please contact me as soon as possible. Students with disabilities needing accommodation should either speak with me or SDRC.

BIOSTAT 6653: FINAL PRESENTATIONS

The following page shows the format for the Biostat 6653 Final Presentations.
Work in pairs –
By Wednesday May 19th: identify pairs

Identify article: Phase II or III randomized, controlled study
(if you have an OK on your article then it’s fine for use here. If no OK is there then work with a partner that has an article that has an OK or find another article (show it to me first))

Final Project:
Present a poster presentation of the article.

Topics to include should cover the parts of a clinical trial that we’ve covered in lecture and that are covered in your reading.

Describe:
Background for the study
  Goals of the study
  Study population
  Eligibility criteria

Administration of the study
  Randomization method
  Blinding
  Number of clinical centers
  Methods of data collection

Study Design and Sample size
  Power

Data collected
  Endpoints
  Safety information

Statistical Analyses

Results and Conclusions
  Statistical results
  Clinical implications of results

Poster: Large poster 36” by 48”. You may use Power Point slides and post them on a poster board.

You will be graded on:
Accuracy of your presentation
Professionalism of your presentation
Clarity of your content
Recommendations

As set forth in the mission statement and the goals and objectives for the programs in Statistics, the objectives and specific competencies listed below constitute the learning objectives for the BS degree program in Statistics at CSUEB. All courses are expected to address a specific and overlapping subset of these overall objectives and to develop specific competencies as required for entry-level statisticians working in the field of statistics.

Overall Objectives for the BS in Statistics

1. To appreciate the basics of modeling and error analysis, particularly those enhanced by the use of cutting-edge computer technology and the most modern computer-intensive statistical methods.
2. To carry out accurate and careful statistical analyses of real world problems and to express these analyses as the meaningful oral and written communication of statistical ideas.
3. To develop the skills to use appropriate statistical computer software in exploratory data analysis, statistical inference, modeling and error analysis.

Specific Competencies

1. Quantitative Reasoning Competencies:
   a. Skill in the application of statistical methods and probability modeling to problems outside of the classroom.
   b. Skill in simulating probabilistic outcomes to assess hypotheses appropriate to real-life examples or hypothetical situations.
   c. Skill in the implementation and interpretation of cutting-edge computer technology for exploratory data analysis, descriptive statistics, and graphical display of data.

2. Critical Thinking Competencies:
   a. Skill in critically evaluating the uses of experimentation and statistical methods
   b. Skill in the identification and use of appropriate statistical models as applied to real-world problems.
   c. Skill in the identification of probability models

3. Communication Competencies:
   a. Skill in presentation (written/oral) of descriptive statistics and inferential statistics
b. Skill in the language of statistical methodology and the ability to translate statistical concepts into non-technical language

4. **Computer Software Competencies:**
   a. Skill in the use of cutting-edge computer technology for collecting, cleaning, and managing data.
   b. Skill in the use of cutting-edge computer technology for inference and simulation studies.

5. **Statistical Concepts and Technical Competencies:**
   a. Skill in critically evaluating the uses of statistics and experimentation, including appropriate applications and deceptive or erroneous reasoning.
   b. Skill in application of design of experiments, sampling.
   c. Skill in the use of statistical methods in hypothesis testing and estimation.

**Pedagogy/Best Practices**

We undertake the following as useful pedagogical strategies to be encouraged in the achievement of the objectives listed above:

1. Faculty teaching statistics course are committed to meeting these objectives for all students.
2. Upper division major courses are taught by tenure track faculty.
3. The Statistics BS degree incorporates material and assignments with relevance to students’ lives, experiences, and future employment, include concrete topics and applications.
4. Statistics course materials are presented in a variety of accessible ways that are understandable to students (e.g., lecture, small group problem-solving, everyday applications, projects).
5. The contributions, experiences, and perspectives of various demographic groups are incorporated into the statistics courses when appropriate.
6. Learning in statistics is viewed as a developmental continuum, and students are given instruction and support appropriate to their developmental needs.
7. Department and/or institutional support and advising are provided for students at risk for not completing the BS requirements in statistics.

**Assessment Tools**

Skills are introduced, practiced, and tested throughout the BS Statistics degree program. Reinforcement of these skills continues throughout the students’ careers at CSUEB. Until we can develop a more specific capstone course, Statistics majors enroll (at or near the end of their program) in the course STAT 4601 Regression. This course was selected because it comes at the end of a sequence of required statistics courses and requires the following:

1. Demonstration of the ability to verbally express statistical concepts, technical reasoning and conclusions in manner appropriate for a lay audience. This is assessed throughout the quarter in homework and examinations.
2. A take-home examination requires demonstration of the ability to correctly identify, apply (through the use of software) and interpret statistical modeling and data analysis in real-world contexts.

Departmental Support

We offer appropriate and necessary support for students to complete the Statistics BS requirements, including the following:

1. Advising to ensure that students select courses appropriate to their needs, interests, and preparation
2. An adequate number and variety of approved courses each quarter with a variety of instructors over the course of the program.
3. Periodic review of courses for frequency of offering (at least once per year), number of sections, variety of perspectives represented, and achievement of departmental objectives (at least at the five-year-review).
4. Active interventions for students identified as at risk of unsatisfactory progress towards completing the requirements.

Student Preparation

Students who major in Statistics must take a foundation of coursework in mathematics through two quarters of mathematics’ major level calculus. Deficiencies in calculus are noted in early coursework, and students are encouraged to repeat calculus and/or the required background courses.

Attachments:

- Statistics major curriculum map with specific competencies
- Department of Statistics Mission Statement
- Syllabus for STAT 4601 – Regression Analysis
- Examination II from STAT 4601
# Bachelor’s Degree in Statistics – Curriculum Map

## Student Learning Outcome

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<tbody>
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<td>Probability concepts and foundations for modelling</td>
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<tr>
<td>Probability theory for statistical inference</td>
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<td>R</td>
<td></td>
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</tr>
<tr>
<td>Apply statistical tools to real-world problems</td>
<td>I</td>
<td>R</td>
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<tr>
<td>Perform computations necessary to solve quantitative problems</td>
<td>I</td>
<td>R</td>
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<tr>
<td>Interpretation of graphical displays</td>
<td>I</td>
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<tr>
<td>Interpretation of descriptive numerical summaries</td>
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<th>Critical Thinking Competencies</th>
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<tbody>
<tr>
<td>Translate real-world problems in statistical terms</td>
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<tr>
<td>Identify components of a statistical problem</td>
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<tr>
<td>Identify probability models</td>
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<tr>
<th>Communication Competencies</th>
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<tbody>
<tr>
<td>Summarize data graphically</td>
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<tr>
<td>Summarize data numerically</td>
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<tr>
<td>Coherent written expression statistical concepts in everyday language</td>
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<tr>
<td>Oral/written presentation of data analysis</td>
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<tr>
<td>Oral/written presentation of statistical inference</td>
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### Bachelor’s Degree in Statistics – Curriculum Map

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<td>STAT1000</td>
<td>STAT2304/2102</td>
<td>STAT3502</td>
<td>STAT3510</td>
<td>STAT3503</td>
<td>STAT4601</td>
<td>STAT3401</td>
<td>STAT3900/4950</td>
<td>STAT3910/4910</td>
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### Computer Software Competencies

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<tr>
<td>Identify appropriate software tools - graphs/summary statistics</td>
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<tr>
<td>Interpret/decipher software output - graphs/summary statistics</td>
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<td>E</td>
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<tr>
<td>Identify appropriate software tools - inferential statistics</td>
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<tr>
<td>Interpret/decipher software output - inferential statistics</td>
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<td>Identify appropriate software tools - statistical models</td>
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<tr>
<td>Interpret/decipher software output - statistical models</td>
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<td>Software for statistical models</td>
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<td>Software for graphical displays</td>
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</tr>
<tr>
<td>Software for statistical inference</td>
<td>I</td>
<td>R</td>
<td>R</td>
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<td>R</td>
<td>E</td>
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### Statistical Concepts and technical skills

<table>
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<td>R</td>
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<td>Hypothesis testing concepts</td>
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<td>R</td>
</tr>
<tr>
<td>Hypothesis testing tools</td>
<td>I</td>
<td>R</td>
</tr>
<tr>
<td>Estimation &amp; Confidence Interval concepts</td>
<td>I</td>
<td>R</td>
</tr>
<tr>
<td>Estimation &amp; Confidence Interval tools</td>
<td>I</td>
<td>R</td>
</tr>
<tr>
<td>Statistical modeling and error analysis concepts</td>
<td>I</td>
<td>R</td>
</tr>
<tr>
<td>Statistical modeling and error analysis tools</td>
<td>I</td>
<td>R</td>
</tr>
</tbody>
</table>
Department of Statistics Mission and Goals Statement

The mission of the CSUH Department of Statistics is to provide excellent education by professional statisticians in statistical theory and practice, and probability theory and modeling appropriate to the various constituencies it serves.

GOALS:

- **For students in all statistics and applied probability courses, as appropriate to the level:** To provide hands-on experience in the use of cutting-edge computer technology for collecting, cleaning, and managing data; exploratory data analysis; graphical display of data; inference; design of experiments; simulation studies; and the most modern computer-intensive statistical methods.

- **For lower-division students and students not majoring in the sciences:** To provide instruction in concepts such as randomness; basic concepts of research design (experiments and surveys); the interpretation of data from experiments and surveys; and summarization and communication of statistical results.

- **For undergraduate majors and minors in the mathematical, physical, life, social, and administrative sciences and engineering:** To provide instruction in statistical methods and probability modeling that will equip students to apply statistical methods in job markets where such education and training is required, or to pursue graduate work with optimal preparation for success.

- **For postbaccalaureate students:** To provide instruction in mathematical statistics and probability theory and in advanced statistical methodology and practice that will prepare them for leadership in the statistical profession, whether through employment in key positions or through further study and research in top-rated Ph.D. programs; to provide them with the depth of understanding necessary for lifelong learning in the field; and to encourage their participation in research under faculty guidance.

- **For all students studying to enter statistical practice:** To provide training in the meaningful oral and written communication of statistical ideas; experience working in teams.

- **For all graduate and undergraduate students in Statistics programs:** To provide cordial, meaningful, and persistent academic advice based on students' career objectives; regular events for networking with professional statisticians, including alumni/ae of our programs; assistance, from the point of view of professional statisticians on our faculty, in applying for employment or Ph.D. study; and encouragement to become participating members of professional statistical organizations.
STAT 4601-01  Regression

Lecture: TuTh 6:00 – 7:50pm at Science, Rm. S149
Instructor: Dr. YanYan Zhou
Office: S452  Phone: 510.885.4609  e-mail: yanyan.zhou@csueastbay.edu
Website: http://www.sci.csueastbay.edu/~yzhou2/4601/4601.htm
Office Hours: ThTu 4:00 to 5:30pm or by appointment


Prerequisite: STAT 3503 or STAT 4000

Topics covered:
- Basic theory in regression
- ANOVA
- Model Selection
- Model assessment
- Graphical techniques
- Assumption checking
- Computer-assisted analysis
- Report writing

Homework:
- Problems will be assigned every two lecture. Homework will be collected at the beginning of the class. Not all problems will be graded.
- No late homework will be accepted.

Exams: There will be total three exams. Two midterm exams will be given approximately in week 4 and week 7. Final exam is on June 10th, 6 - 8pm

The final grade is calculated as Homework 20% + midterm I x 25% + midterm II x 25% + final x 30%.

Grading Policy
A (90% and above)  B(75% to 89%)  C (65% to 74%)  D (55% to 64%)  F (54% and under)

Subjective factors may also be taken into account in deciding grades for students on borderlines: regularity of attendance, quality of participation in class discussion, and clarity of writing.

Policy on Make-up Tests: No make-up homework or exams. Make-up midterms may be allowed given a genuine emergency, illness, or other hardship; written documentation must be provided. Make-up midterms must be arranged before the midterm time and will be given after the midterm time. Make-up midterms will cover the same material but may be a different test. No make-up final exam.
W & IN: The Statistics Department follows very carefully the rules as stated in the Catalog for giving W (weeks 4-7) and IN (8th week on) grades. In particular, you will not receive a W or IN grade if the only reason is poor academic performance.

Housekeeping: Please arrive on time both at the beginning of class and after break. Please turn off all electronic devices such as pagers, cell phones, etc. no conversations in class.

UNIVERSITY POLICIES FOR INCLUSION ON SYLLABI

Emergency Information
California State University, East Bay is committed to being a safe and caring community. Your appropriate response in the event of an emergency can help save lives. Information on what to do in an emergency situation (earthquake, electrical outage, fire, extreme heat, severe storm, hazardous materials, terrorist attack) may be found at: http://www.aba.csueastbay.edu/EHS/emergency_mgnt.htm
Please be familiar with these procedures. Information on this page is updated as required. Please review the information on a regular basis.

Policy on Academic Dishonesty:
The University has a published policy on cheating and academic dishonesty. Students are expected to be familiar with the policy and to abide by it. Cheating will result in: 1) a zero score on the test and the loss of all grading options; and/or 2) an "F" grade for the course; and/or 3) referral to the Academic Vice President for expulsion from the University.

Accommodations for Students with Disabilities:
If you have a documented disability and wish to discuss academic accommodations, or if you would need assistance in the event of an emergency evacuation, please contact me as soon as possible. Students with disabilities needing accommodation should either speak with me or SDRC.
4601 Take home Midterm

Instructions:
1. This is a take-home exam, but independent work is required. You agree that you will not discuss with anyone else by any means of communications until the exam period is over. Any violation of the rules regarding consultation with others will be considered honor code violations.

2. You’ll type your exam answer into Microsoft Word. All relevant Minitab/SAS output must be attached. If you are using SAS, SAS code must be attached.

3. Your must turn in your work (with your name printed on every page) to me at the beginning of Tues Class(May 25th).

4. For all model fitting, check for model assumptions.

(Problems on next 2 pages)
1. Consider the data set “Reading Data.csv” This is information about individuals' reading comprehension (rdg comp) from a paragraph, related to their ages (age years), years of education (yrs educn), vision score (vision sc), and race (“White”, “African American”, “Asian”, “Others”). We anticipate that only years of education would be positively related to the outcome; the others should be negatively or not significantly related to the outcome. Subject ID should be ignored in your analysis. Below is a snippet of the data set.

<table>
<thead>
<tr>
<th>SUB ID</th>
<th>Age (years)</th>
<th>Yrs Educn</th>
<th>Rdg Time</th>
<th>Rdg Comp</th>
<th>Vision SC</th>
<th>Race</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>12</td>
<td>38</td>
<td>5</td>
<td>12</td>
<td>White</td>
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<tr>
<td>2</td>
<td>83</td>
<td>12</td>
<td>20</td>
<td>5</td>
<td>19</td>
<td>Asian</td>
</tr>
<tr>
<td>3</td>
<td>81</td>
<td>11</td>
<td>32</td>
<td>2</td>
<td>19</td>
<td>African American</td>
</tr>
<tr>
<td>4</td>
<td>89</td>
<td>13</td>
<td>51</td>
<td>3</td>
<td>19</td>
<td>Others</td>
</tr>
</tbody>
</table>

(a) [7 points] Write the theoretical model that relates reading comprehension to age, years of education, reading time, vision score and race.

(b) [10 points] Give the estimated regression line for the model and interpret the coefficients (if a coefficients is not interpretable, explain why).

(c)
(i) [4 points] Test the assumption of normality. (Give the name of the test you use, the p-value, and your conclusion.)

(ii) [4 points] If the test of normality fails, what action should you take? (Regardless of your conclusion in (c)(i), you don't need to take the action here.)

(d) (i) [4 points] Test the assumption of constant variance. (Give the name of the test you use or explain how you did it, and then give the p-value, and your conclusion.)

(ii) [4 points] If the test of constant variance fails when normality is satisfied, what action should you take? (Regardless of your conclusion in (d)(i), you don't need to take the action here.)

(e) [5 points] Consider a model with interaction terms (education * race). Is the interaction significant?

(f) [12 points] Consider a full model

\[ Y = \text{age} + \text{years of education} + \text{reading time} + \text{race} + \text{education} \times \text{race} \]

And a reduced model

\[ Y = \text{age} + \text{years of education} + \text{reading time} \]

Regardless of the statistical significance of the predictors, use a partial F-test to decide whether the reduced model is significantly better than the full model. State the hypotheses. Then, give the value of the appropriate test statistic and the p-value. Finally, state your conclusion in the context of this problem.
2. Take the monthly hotel room average for 14 years data set from book page 297. The dataset is available at the accompanied CD. (5 points each)

1) Create a new data called quarterly hotel room average, where the quarterly hotel room average is calculated by averaging the 4 months responses within each quarter.

2) Do a time series plot of the quarterly dataset. Do you observe seasonal variation? If the answer is yes, what type of seasonal variation appears to exist? Is a transformation needed to obtain a series that displays constant variation?

3) Use the quarterly dataset to fit the following two models:

\[ Y_t = \beta_0 + \beta_1 t + \beta_2 Q_1 + \beta_3 Q_2 + \beta_4 Q_3 + \epsilon_t \]

and

\[ Y_t = \beta_0 + \beta_1 t + \beta_2 t^2 + \beta_3 Q_1 + \beta_4 Q_2 + \beta_5 Q_3 + \epsilon_t \]

a) Write down the prediction equation for each model.

b) Which one is a better model? Justify your answer.

c) Use you selected model from b) to report point forecast and 95% prediction interval for hotel room averages at \( t=57, 58 \).

d) Do all the residuals on the output from selected model b) seem to be of same magnitude? Identify influential point if there is any.

e) Test for positive autocorrelation by using Durbin-Watson Statistic, using \( \alpha=0.05 \).

4) Use SAS proc arima to analyze the following model:

\[ Y_t = \beta_0 + \beta_1 t + \beta_2 Q_1 + \beta_3 Q_2 + \beta_4 Q_3 + \epsilon_t \]

Where \( \epsilon_t = \varphi_1 \epsilon_{t-1} + a_t \)

a) Identify the estimated value for \( \varphi_1 \). Is it statistically different from 0?

b) Write down the prediction equation for the above model.

c) Based on the above prediction equation report the point forecasts for the hotel room averages at \( t=57, 58 \).
APPENDIX E

CSUEB ENROLLMENT AND FTES

The information for Appendix E is only available electronically; it is a large Excel spreadsheet that could not be converted to a Word document. The file will be provided.

APPENDIX F

CSUEB OVERALL ENROLLMENT BY ETHNICITY AND GENDER

The information for Appendix F is only available electronically; it is a large Excel spreadsheet that could not be converted to a Word document. The file will be provided.

APPENDIX G

CSUEB COLLEGE ENROLLMENT AND FTES

The information for Appendix G is only available electronically; it is a large Excel spreadsheet that could not be converted to a Word document. The file will be provided.
APPENDIX H

CALIFORNIA STATE UNIVERSITY, EAST BAY
APR SUMMARY DATA
FALL 2005 - 2009

<table>
<thead>
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<th>Statistics</th>
<th>Fall Quarter</th>
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<td><strong>B. Degrees Awarded</strong></td>
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<td>2. Graduate</td>
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<td>3. Total</td>
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<td>Lecturer Headcount</td>
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<td>6. Total Non-Tenure Track</td>
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<td>7. Grand Total All Faculty</td>
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<td>Instructional FTE Faculty</td>
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<td>9. Lecturer</td>
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<td>12. FTES Taught by Lecturer</td>
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<td>13. % FTES Lecture/FTES Generated</td>
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<td><strong>D. Student Faculty Ratios</strong></td>
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<td>3. SFR By Level (All Faculty)</td>
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### Headcount Enrollment

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<td></td>
<td>Graduate</td>
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<td>Total</td>
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<td>37</td>
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|                      | Statistics    | 10 | 11 | 9  | 14 | 20 |
|                      | Undergraduate | 71 | 94 | 74 | 80 | 92 |
|                      | Total         | 81 | 105| 83 | 94 | 112|

### Degrees Awarded

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<th>05-06</th>
<th>06-07</th>
<th>07-08</th>
<th>08-09</th>
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<td></td>
<td></td>
</tr>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
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### Student Faculty Ratios

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<tr>
<td>Tenured/Track</td>
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<td>0</td>
<td>15.62</td>
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<td>Lecturer</td>
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<td>SFR By Level (All Faculty)</td>
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<td>15.62</td>
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<td>0</td>
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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)
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<thead>
<tr>
<th>2. Lecturer</th>
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<td>4. Lower Division</td>
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<td>5. Upper Division</td>
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New Faculty Justification: Department of Statistics and Biostatistics

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 existed 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 be come 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.

6 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.

6 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:
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" form) 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).
VCL Demo

Dr. Eric Suess, Chair, Department of Statistics and Biostatistics

Setareh Sarrafan, Director, User Support Services, ITS

Alex Patterson, Technical Coordinator, VCL, ITS
Outline

- What is Virtual Computing?
- What is a Computer Lab?
- What is the Virtual Computing Lab (VCL) and how can a faculty member use it in their classroom with Students?
- Not just the software, but the OS also.
- Where to log in and how to use it.
- VCL Demos - R, SPSS, SAS, Minitab, MS Office
- Other related Cloud software you can suggest to students
What is Virtual Computing?

- Running software that is on the internet, usually through a web browser.
- We are all doing this now.
  - gmail, google docs, spreadsheets, forms
  - Blackboad, CSUEB library databases, my.csueastbay.edu
- Some utube videos about Cloud computing
  - IBM ad
  - Basics of Cloud computing
- eyeos, OOS, humyo
- amazon EC2
What is a Computer Lab?

• It is a room filled with computers.

• You can work with a group of students sitting at a computer running a software program.

• The software is installed on each computer.

• This setup requires the university to have a physical computer and to pay for the electricity to run the computer on campus.
What is a Virtual Computer Lab?

- It is a collection of virtual computers that can be accessed anywhere in the world through the internet and run on any computer.
- You can work with your students in a standard lab setting if only a browser is installed. And your students can work on the same virtual computer anywhere they want. They do not have to come to campus to sit at a computer where the software is installed.
- The software is installed once and shared virtually.
- With this setup the idea is to have less computers on campus for specialized needs and to give student more access to the software used with instruction of classes.
What is the VCL?

"The Virtual Computing Lab (VCL) allows students to access the software applications you need them to use for your courses seven days a week, 24 hours a day from campus, home, or any place where they have a browser and Internet access. Complex, expensive software can run on an old PC or a Mac. Come see a demo and learn how you can use the VCL for your courses and students."

- Lee Thompson
Not just the software, but the OS also.

- The CSU VCL delivers specialized virtual computers with specialized software installed on each virtual computer.
- AKA running a Remote Desktop.
- To log in to the CSU VCL at: https://vcl.calstate.edu/vcl/
- VCL_Quickstart.pdf
- MacRDPInstall.pdf
- Next are some screenshots.
VCL Demo: SPSS
VCL Demo: SPSS

- Problem, cannot see what is going on due to default resolution setting. How to change that.

- How to copy and paste output.

- How to upload a document to Blackboard.
How to copy and paste

• Question, how to copy and paste to the local computer?

• Question, how to save a file from the VC to the local computer?
How to upload a file to Blackboard
How to change resolution
How to change the resolution
Log out

• When the student logs out of the VC they are using, all of their changes and saved documents are gone. So each student needs to save their work to Blackboard or elsewhere.
• I like the suggestion to use the online storage in Blackboard because it further develops the student sophistication with the use of Virtual Computing software. And it integrates the new VCL with Blackboard, which students are used to. Or suggest the use of humyo.
• The key thing is the next time they log in to use the particular VCL they use they will be starting with a fresh VCL.
Other related Cloud software you can suggest to students

- I guess the first thing to say, in my experience, it is good to suggest things to use. But it is alway good to ask what the students in the class use. They will usually know what you are asking about and are using the most current software.
- google docs
- google presentation
- google forms
- or try zoho
- LinkedIn
- OOS, eyeOS
- humyo, Dropbox
- Twitter, Facebook, etc.
- read blogs
Questions?

- If you have any further questions you can contact me directly. I like discussing the use of web based software for teaching.

- Eric A. Suess, eric.suess@csueatbay.edu
My hopes

• That students end their use of flash drives and printing.

• There are many options for saving and sharing files to use. This should be encouraged.

• There are ways to avoid printing, but this requires the faculty member to be willing to grade online. This can be hard to get used to.
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.