



**COMMITTEE ON ACADEMIC PLANNING AND REVIEW  
ANNUAL PROGRAM REPORT**

College	CoS
Department	Statistics and Biostatistics
Program Unit	
Reporting for Academic Year	2014-2015
Department Chair	Eric Suess
Date Submitted	6/17/2015

**1. SELF-STUDY (about 1 page)**

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

The five year review includes planning goals for curriculum (3.1), students (3.2), faculty (3.3), and resources (3.4). To summarize, the curriculum plans include:

1. Updating our MS programs' curriculums
2. Offer required MS courses as graduate-only courses
3. Continue offering two sections of core graduate courses and grow our graduate program
4. Update our MS options to reflect demand
5. Enhance our BS program to reflect our SLO's and industry demands

The student plans include:

1. Grow our MS programs
2. Enhance and grow our BS program
3. Recruit community college students into our BS program
4. Increase the use of computation in courses (at all levels)
5. Continue teaching schedules that accommodate working students
6. Raise funds to increase our scholarship and leadership funds

Faculty plans include:

1. Anticipation of our junior faculty receiving tenure/promotion so that they can devote more time to program development and enhancement
2. Hire tenure-track faculty to replace recent attrition due to retirement and resignation
3. Hire faculty with expertise reflecting industry demands in Statistical Computation, Large Data Analysis, and Data Analytics
4. Increase our number of long-term lecturers

Resource plans include:

1. Upgrade computers for tenured/tenure-track faculty and lecturers
2. Explore the use of "clickers" in introductory statistics courses
3. Increasing our current 1.0 staff support to our former level of 1.75 staff support.

## **B. Five-year Review Planning Goals Progress**

### Regarding 3.1 (Curriculum):

1. We offered two new courses (6610 Data Visualization and 6620 Statistical Learning) this year. As noted in last year's report 6401 was offered as an elective course, though the demotion from required doesn't appear until the AY 2015-6 Catalog.
2. The required courses were all offered as MS-only during the recommended quarters. 6204 and 6304 were offered as tiered courses outside of the Fall Quarter. 6250 was offered as tiered in the Fall Quarter (MS Biostatistics students are required to take the course in the Spring Quarter).
3. Core courses required for both MS Biostatistics and MS Statistics (6204, 6205, 6304, 6305, 6509, 6501, 6502) were offered in two sections in the corresponding quarters.
4. The MS Statistics option changes have been deferred to semester conversion.
5. The BS program had the new graduate courses (6610/6620) offered as tiered courses for majors. So, there were more courses available for majors.

### Regarding 3.2 (Students):

1. The total number of MS students was approximately the same this year as last year.
2. The total number of BS students was approximately the same this year as last year.
3. We did have transfer students enter our program, but not enough to offset graduating students.
4. On top of previously-existing courses using computing (e.g., 6304, 6305, 6509), 6610 and 6620 brought a marked increase in the use of computation. We note that 6620 had such high demand that there were 2 sections offered in the Spring Quarter.
5. Core courses and most electives in our graduate program were offered after 6. Many undergraduate required courses were also offered after 4.
6. Fundraising did not increase this year.

### Regarding 3.3 (Faculty):

1. Professors Eudey and Fan were both promoted to (full) professor at the end of the academic year. Professor Chatterjee was retained.
2. The Department received approval to hire during the 2015-6 academic year. Professor Fan is going to chair the hiring committee.
3. The hire was approved for data science, which might include analytics and big data.
4. Staffan Fredricsson became entitled to a three-year contract.

### Regarding 3.4 (Resources):

1. Some professors received upgraded computers this year.
2. The Department has abandoned the idea of using clickers. The attempts did not work to the faculty's satisfaction.
3. Our staffing level has remained the same.

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

Pursuant to the new policy, there will be no further curricular changes until semesters begin. The Department was funded at over \$60,000 for semester conversion and intends to make transformative changes for the new regime.

During the Spring Quarter, the Department was informed that it will not be moving to the new building. The faculty were looking forward to having solo offices to improve the atmosphere for advising and are disappointed that this is not coming to pass.

With the increased use of computing across all levels, the faculty intends to seek a computing space for students- particularly majors- to work on their statistical projects using the available software.

## **2. SUMMARY OF ASSESSMENT (about 1 page)**

### **A. Program Student Learning Outcomes**

Student learning outcomes for MS in Statistics are:

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

Student learning outcomes for MS in Biostatistics are:

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

Student learning outcomes for BS in Statistics are:

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

### **B. Program Student Learning Outcome(s) Assessed**

For MS in Statistics we assessed SLO's 1, 2, 3, 4, and 6.

For MS in Biostatistics we assessed SLO's 1, 2, and 3

### **C. Summary of Assessment Process**

We have long used the culminating experience of the Comprehensive Examination along with feedback from alumni and community industry leaders in assessing our programs. Student learning outcomes and institutional learning outcomes were previously identified and mapped to specific courses for all three programs (in Spring 2014, refer to program curriculum maps).

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

The SLO's that were not evaluated by the Comprehensive Examination involve communication skills (SLO #5 for Statistics MS and SLO #2 for Biostatistics MS). It was decided that these SLO's are better addressed by term projects that involve communication (either a written project or presentation that is worth considerable weight in the grading scheme of the course). For the Statistics MS SLO #5, STAT 6509 "Theory and Application of Regression" will be used for assessment. This year the course was formally selected and the rubric developed but not yet implemented. For Biostatistics MS SLO #2, BSTA 6653 "Clinical Trials in the Pharmaceutical and Biomedical Industries" is used for assessment. This year the course was formally selected, the rubric was developed and implemented.

For the Statistics BS program STAT 4601 "Regression" was formally identified as the course to use for end-of-program assessment.

All implementations of academic assessment took place after the last faculty meeting of the academic year, hence faculty review and any changes to the curriculum will be done in the future. We anticipate that any changes we decide upon will be implemented in the semester conversion process as we transform the programs.

#### **D. Summary of Assessment Results**

Our comprehensive examination is our primary method of assessing both master's degree programs. The tests are written to test knowledge from the required core courses for each program. Typically our pass rate is 75% or higher. Combined over the past few years, the average pass rate for Statistics MS is 80% (SD = 18%) and the average pass rate for Biostatistics MS is 76% (SD = 31%). For Spring 2015 the pass rate for Statistics is 73.2% and the pass rate for Biostatistics is 94.4%. Most of the students take the comprehensive examination in the Spring (Spring 2015, n = 41 for Statistics and n = 18 for Biostatistics).

This year we initiated the use of a rubric to assess the individual ILO's as described above. Rubrics used were on a 5-point scale with 5 denoting exemplary demonstration of the SLO involved and 1 denoting no or very poor demonstration of the SLO involved. For each MS program frequency tables are shown below (by program and SLO) for Spring 2015 comprehensive examination. For Biostatistics MS the rubric for SLO #2 is added. Tables 2 and 4 show summary statistics for the SLO's.

Table 1: Frequencies of Rubric-Scores for Statistics MS 2015

	SLO 1	SLO 2	SLO3	SLO 4	SLO6
Rubric Score 0	1	0	0	0	1
1	5	7	2	1	12
2	5	12	5	5	11
3	4	18	14	5	12
4	19	4	11	4	4
5	7	7	6	19	1
Total	41	41	38	41	41

Table 2: Summary Statistics of Rubric Scores for Statistics MS 2015

Statistic	SLO 1	SLO 2	SLO3	SLO 4	SLO6
Minimum	0	1	1	0	0
Maximum	5	5	5	5	5
Mean	3.37	2.56	3.37	3.37	2.22
Standard Deviation	1.37	1.10	1.08	1.37	1.13

Table 3: Frequencies of Rubric Score for Biostatistics MS 2015

	SLO 1	SLO 2	SLO3
Rubric Score 0	0	0	0
1	6	0	0
2	5	0	1
3	5	2	7
4	2	7	4
5	0	9	6
Total	18	18	18

Table 4: Summary Statistics of Rubric Scores for Biostatistics MS 2015

Statistic	SLO 1	SLO 2	SLO3
Minimum	1	3	2
Maximum	4	5	5
Mean	2.17	4.39	3.83
St Deviation	1.04	0.70	0.99

The Statistics and Biostatistics Department evaluates the results of the comprehensive examination twice per year. This information, along with student feedback, alumni feedback, and information about current industry demands for specific statistical skills has led to our recent modernizing of our curriculum. This year, two new courses were offered: in Winter, STAT 6610 “Data Visualization” and in Spring, STAT 6620 “Statistical Learning with R.” Professor Eric Suess developed and taught both courses. Both courses were very well received and in heavy demand (a second section of STAT 6620 was added due to student demand, and STAT 6610 had over 40 students).

Next year we will incorporate the information learned from the assessment of the individual rubrics from the tools used this year.

### **3. STATISTICAL DATA (about 1 page)**

Institutional Research, Analysis and Decision Support (IRAD) produces program statistics annually in standard format. These statistics (available on their page [here](#)) will be attached to the Annual Report of the Program Unit. This statistical document is expected to be approximately one page long and will contain the same data as required for the five-year review including student demographics of majors, student level of majors (e.g. Juniors, Seniors), faculty and academic allocation, and course data.

The Annual Report may include one or two pages of supplemental information, as appendices, in the form of graphical presentation (e.g., line graphs), tables, and pertinent discussion which summarize the data of the last several (3-5) years to make changes and trends more apparent.

Fall 2014	Biostatistics MS	Statistics BS	Statistics MS
Asian	11	6	59
Black	5	1	1
Hispanic	5	2	4
White	9	7	21
Two or more		1	2
Unknown	6	1	15
Total	36	18	102

Fall 2014	Biostatistics MS	Statistics BS	Statistics MS
Female	22	8	45
Male	14	10	57

#### Degrees conferred by program

Major	Baccalaureate					Master's					Total				
	AY 09- 10	AY 10- 11	AY 11- 12	AY 12- 13	AY 13- 14	AY 09- 10	AY 10- 11	AY 11- 12	AY 12- 13	AY 13- 14	AY 09- 10	AY 10- 11	AY 11- 12	AY 12- 13	AY 13- 14
Bio- statistics						21	11	12	20	10	21	11	12	20	10
Statistics	8	3	8	4	3	30	49	43	55	37	38	52	51	59	40

Student information by level and academic allocations are not available for AY 14-15.



