

**SJSU Annual Program Assessment Form
for Degrees, Certificates and Credential Programs
2020 Report**

Department: Mathematics and Statistics
Program: MS Statistics
College: Science
Program Website: https://www.sjsu.edu/math/programs/graduate/
Link to Program Learning Outcomes (PLOs) on program website: https://www.sjsu.edu/math/assessment/ms-statistics-plo/
Program Accreditation (if any):
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Date of Report: March 15, 2021

Part A

1. List of Program Learning Outcomes (PLOs)

PLO 1:	Carry out appropriate inferential procedures based on probability theory and the mathematical theory of statistics.
PLO 2:	Use technology and statistical software to perform advanced statistical analyses.
PLO 3:	Communicate and present specialized statistical concepts clearly in oral, graphical, and written forms using appropriate technical terms in a way that is accessible to a general audience.

2. Map of PLOs to [University Learning Goals \(ULGs\)](#)

ULG 1 – Specialized Knowledge PLOs 1 and 3
ULG 2 – Broad Integrative Knowledge PLOs 1, 2, and 3
ULG 3 – Intellectual Skills PLOs 1, 2, and 3
ULG 4 – Applied Knowledge PLOs 2 and 3
ULG 5 – Social and Global Responsibilities PLOs 1 and 3

3. Alignment – Matrix of PLOs to Courses

PLO/Courses	MATH 163	MATH 164	MATH 167R	MATH 167PS	MATH 261A	MATH 269
PLO 1	1	2 (A)				
PLO 2	1		1		2 (A)	
PLO 3	1	1	1	1	2	3 (A)

*1 - Introduced, 2 - Reinforced, 3 - Mastered

4. Planning – [Assessment Schedule](#)

	2020	2021	2022	2023	2024
PLO 1					A
PLO 2	A		I		
PLO 3			A		I

5. Student Experience

The PLOs are communicated to our students through our website at <https://www.sjsu.edu/math/assessment/ms-statistics-plo/>

Part B

6. Assessment Data and Results

In Fall 2020, we assessed PLO 2, “Use technology and statistical software to perform advanced statistical analyses” in MATH 261A (Regression Theory and Methods).

Instruments

The following course learning objectives (CLOs) are used to assess PLO 2:

CLO 1:	Develop appropriate regression models for given applications
CLO 2:	Assess the validity of model assumptions for given applications
CLO 3:	Set up and test meaningful hypotheses for given applications
CLO 4:	Analyze data using statistical software and formulate conclusions in the context of the problem

CLO 1 was assessed through homework problems 8.6, 8.13, 8.14, 8.17, 9.17ab, and 9.18 from the required textbook, *Introduction to Linear Regression Analysis*, 5th edition, 2012, by Montgomery, Peck & Vining, Wiley (ISBN-978-0-470- 54281-1). These problems require the students to develop appropriate regression models for a variety of data sets, including those with categorical predictors and multicollinearity. Some problems require the comparisons of two or more fitted models.

CLO 2 was assessed through homework problems 4.1, 4.5, 4.8, 5.3 from the required textbook as well as the second problem in the second midterm exam. These problems are related to the assessment of model adequacy and validity through residual analysis and plots.

CLO 3 was assessed through homework problems 2.12, 3.1, 7.18, 7.21 from the required textbook as well as the second problem in the first midterm exam. These problems require the students to set up and test the relevant hypotheses to assess the statistical significance of the individual predictors in a given model as well as the statistical significance of the model as a whole.

CLO 4 was assessed through a final project, which requires the use of the R statistical software to perform a comprehensive regression analysis on a data set. Students worked in pairs and each pair analyzed a distinct data set that consists of at least 500 observations and 7 predictors (at least one of which needs to be a categorical variable). Each pair had to present their results to the class as well as submit a technical report that provides details on their analysis, including variable selection, model fitting, model diagnostics, and interpretation of the results.

Data

A total of 26 students were enrolled in the class, of which 18 were students in the MS Statistics program. The remaining students included 5 who are enrolled in the MS Data Science program, a graduate student from Electrical Engineering, an undergraduate student from the Department of Computer Science, and a high school senior taking the course as an open university student. We included only the students enrolled in the MS Statistics program in our analysis.

Results

CLO	Number of students assessed	Number of students (%) achieving the CLO	Number of students (%) NOT achieving the CLO	CLO achieved	Benchmark
1	18	17 (94.4%)	1 (5.6%)	Yes	70%
2	18	15 (83.3%)	3 (16.7%)	Yes	70%
3	18	18 (100%)	0 (0%)	Yes	70%
4	18	18 (100%)	0 (0%)	Yes	70%

PLO	Number of students assessed	Number of students (%) achieving the PLO	Number of students (%) NOT achieving the PLO	PLO achieved	Benchmark
2	18	18 (100%)	0 (0%)	Yes	70%

**Remark: A student is considered to have achieved the PLO if he or she achieved at least three CLOs.*

7. Analysis

Every student was able to achieve at least three of the CLOs used to assess PLO 2. The course content used to assess CLO 2 is covered early in the semester, which is perhaps why the number of students achieving CLO 2 is the lowest (but still high) among all the CLOs assessed.

8. Proposed changes and goals (if any)

Given the findings, no changes are proposed.

Part C

9. Program Learning Outcomes

What are your proposed closing-the-loop action items and completion dates?

No action required.

Describe the progressive changes and the status in the table below.

Proposed Changes and Goals	Status Update (what's being done and results observed)	Date reported

10. Program planning action items (only program planning items to be entered here)

What is the DIRECT WEB LINK to your program's latest action plan? (You can find it by selecting the relevant college in [Program Records](#) to locate your program towards the bottom of the webpage.)

Place your link here: <https://drive.google.com/file/d/0B2mlgwOdtz6VeFEtSmFuWjE2STQ/view>

Describe THE ASSESSMENT RELATED ACTION items from your latest program planning and describe the status in the table below.

Action item description	Status Update (what's being done and results observed)	Action started on	Action completed on
Revise the PLOs so that they are better aligned with what we intend the students to learn in our program.	The revision has been completed and the new PLOs are more precise and allow for meaningful assessments.	November, 2019	March, 2021
Standardize the CLOs to be used in the assessment of the PLOs to facilitate year-to-year comparisons.	We have identified 4 CLOs for assessing PLO 2.	July, 2020	Ongoing