

# Assessment Report: Mathematics - Statistics Option 2017- 2018

## Fall 2017 Assessment Results

Assessment conducted by: John Borkowski; Reviewed by Statistics Faculty

According to the below description of Statistics Programs Learning Outcomes and Assessment, 6 students declaring statistics option majors or minors were assessed for Outcomes 1 and 2 in STAT 446 based on the final sampling project as a signature assignment.

**Outcome 1:** *Given a scientific question, students will design an appropriate sampling plan or experimental design (Stat 446).*

Based on the Proposals submitted for the final sampling project, all six students were assessed at the Acceptable or Excellent levels for Outcome 1.

Recommendations: With 100% of students assessed at the acceptable or excellent levels, the goal of having at least 50% acceptable or excellent is satisfied.

**Outcome 2:** *Given a sampling plan or experimental design, students will be able to execute the plan or design (Stat 446).*

Based on the implementation of the sampling designs provided in the student Proposals submitted for the final sampling project, all six students were assessed at the Acceptable or Excellent levels for Outcome 2.

With 100% of students assessed at the acceptable or excellent levels, the goal of having at least 50% acceptable or excellent is satisfied.

## Spring 2018 Assessment Results

Assessment conducted by: Andrew Hoegh; Reviewed by Statistics Faculty

According to the below description of Statistics Programs Learning Outcomes and Assessment, 10 students declaring statistics option majors or minors were assessed for Outcome 3 in STAT 408 based on Question 1 on the final exam as a signature assignment.

**Outcome 3:** Students will use appropriate technology and statistical computing skills to conduct statistical analysis.

Of the 10 students assessed for outcome 3, eight students were assessed at the Acceptable or Excellent levels, one student was assessed at a marginal level, and one student did not complete the assignment (or the class).

With 80% of students assessed at the acceptable or excellent levels, the goal of having at least 50% acceptable or excellent is satisfied.

**Recommendations:** The program is meeting its goals. The recommendation for the coming year is to continue to review the assessment plan to ensure alignment between coursework and program learning outcomes. This is the first year of the program review that uses Stat 446, Stat 408, Stat 411, and Stat 412.

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### Program Learning Outcomes

- 1) Given a scientific question, students will design an appropriate sampling plan or experimental design (Stat 446).
- 2) Given a sampling plan or experimental design, students will be able to execute the plan or design (Stat 446).
- 3) Students will use appropriate technology and statistical computing skills to conduct statistical analyses (Stat 408).
- 4) Given a scientific question and information about the study design used to collect data, students will be able to conduct an appropriate statistical analysis (Stat 411, Stat 412).
- 5) Students will be able to explain and interpret the results of a statistical data analysis in a written report, and in a way that is consistent with research question and study design. (Stat 411, Stat 412)

### Curriculum Map and Assessment Schedule

	Outcomes					Assessment Schedule
	1	2	3	4	5	
STAT 408: Stat Computing and Graph Analysis			X			Even Spring Semesters
STAT 411: Methods for Data Analysis I				X	X	Even Fall Semesters
STAT 412: Methods for Data Analysis II				X	X	Odd Spring Semesters
STAT 446: Sampling	X	X				Odd Fall Semesters

### Rubric

Learning Outcome	Unacceptable	Marginal	Acceptable	Excellent
(1) <i>Given a scientific question, students will design an appropriate sampling plan or experimental design</i>	The plan is not statistically valid.	The plan is statistically valid but fails both of the other two criteria for excellence.	The plan is statistically valid but fails one of the other two criteria for excellence.	The plan is feasible, statistically valid and directly addresses the scientific question.
(2) <i>Given a sampling plan or experimental design, students will be able to execute the plan or design.</i>	The student fails to follow the plan in such a way they show they do not understand what the plan is asking them to do. The resulting data is not appropriate for the study.	The student fails to follow the plan in a minor way but the result is the data is not appropriate for the study.	The student collects the appropriate data but fails to follow the plan exactly. The failure to follow the plan is a minor problem that does not invalidate the resulting data.	The student collects the appropriate data according to the plan.

<p>(3) <i>Students will use appropriate technology and statistical computing skills to conduct statistical analyses.</i></p>	<p>The student is unable to read in data, or cannot access help pages, or cannot create appropriate plots.</p>	<p>The student correctly reads data into a stats package and provides plots to show relationships between two categorical and/or quantitative variables. Student is able to access help pages to find appropriate arguments and syntax.</p>	<p>In addition to the marginal requirements, the student is able to convert data types or change between long and wide data formats.</p>	<p>In addition to the acceptable requirements, the student builds macros or functions to perform tasks which must be repeated.</p>
<p>(4) <i>Given a scientific question and information about the study design used to collect data, students will be able to conduct an appropriate statistical analysis</i></p>	<p>The student fails to recognize any appropriate method for question and data. The implementation does not matter.</p>	<p>The student may recognize the best statistical method or chose a sub optimal but appropriate method, however they implement the method they have chosen incorrectly and arrive at an incorrect answer.</p>	<p>The student does not recognize the best statistical method but chooses one that can be considered reasonable. They implement the method they have chosen correctly and arrive at the correct answer for their method.</p>	<p>The student recognizes the best statistical method to use, chooses the correct approach to analyze the data, and arrives at the correct answer.</p>
<p>(5) <i>Students will be able to explain and interpret the results of a statistical data analysis in a written report, and in a way that is consistent with research question and study design.</i></p>	<p>Major flaws in terms of the statistical results, scope of inference and vocabulary which invalidate the conclusions or the report is so poorly written that it is very difficult to read and extract the relevant information. The student did not display an understanding of what needed to be done.</p>	<p>There may be flaws in terms of the statistical results, scope of inference, and vocabulary that invalidates some of the conclusions. The student displayed an understanding of what needed to be done but the execution was flawed. The report may ramble and have several writing errors but it is readable.</p>	<p>There may be minor flaws in terms of the statistical results, scope of inference, and vocabulary, but nothing that invalidates the conclusions. It may not be concise and it may have several writing errors but overall it is easily readable.</p>	<p>The report is clear and concise. It is correct in terms of the statistical results, scope of inference, and vocabulary. It has minimal writing errors (grammar, spelling, etc.)</p>

## Threshold

*At least half of the students assessed for outcomes in a particular year will be “excellent” or “acceptable.”*