Department: Natural & Computer Sciences	**Date:** 5/20/20

Members involved with analysis of artifacts: Robert Hermann, Brent Royuk, John Jurchen, Kristy Jurchen, Marcus Gubanyi, Kent Einspahr, Dennis Brink, Kregg Einspahr, Kyle Johnson, Connie Callahan, Jen Fruend.

See #1 Undergraduate Program Assessment Plan: Student Outcomes for:
a) Student Outcome; b) Background; c) Question(s); d) Methodology

Analysis of artifacts:

1). **PERFORMANCE CRITERIA*** - *How was data analyzed? (attach rubrics/scoring tools if used).*
Artifacts were analyzed according to the attached rubric. Rubrics were sent to the faculty beforehand for review, and the departmental faculty met together and scored the artifacts through discussion and consensus.

Summary of RESULTS*:

1). Restate the assessment question(s) (from the Assessment plan):

Are students able to use appropriate methods to verify the accuracy and robustness of their results?

2). Summarize the assessment results. (A narrative summary is required. Charts, tables or graphs are encouraged but optional.)

A total of 23 artifacts were analyzed from the following courses: Bio 317, Chem 355, Phys 382. (CS 141 was intending to provide artifacts but was unable to do so.)

Course	Scores					
	1	2	3	4	5	Comments
Bio 317	2	3	5	1	2	Wide range of results - overall students should have done better
Chem 355	0	0	1	5	2	Generally well done, within the constraints of the projects.
Phys 382	0	0	1	1	1	Generally adequate, some very well done.

Overall, 18 out of 23 artifacts met the 3 or above criteria, 78%.

3). INTERPRETATION* - Discuss how the results answer the assessment question(s).

Overall we failed to meet the goal of 80% criterion for success, so we are not able to state that students can generally sue appropriate methods to verify the accuracy and robustness of their results. However, we were unable to assess a CS artifact, which probably would have raised our overall scores. And the Biology artifacts were the first time they were assessed in this manner, and due to the way the data were collected, the Biology scores include scores from two students who did not actually complete the assignment. Treating those two data points as "incomplete" or as non-data rather than as affirmative evidence of failure would raise the overall departmental score to 86% (18 out of 21) and meet the criterion for success.

Generally, students are better able to apply the statistical methods than to explain what they did or to interpret the results.

4). Observations made that were not directly related to the question(s).

Sharing of Results: *When were results shared? Date:* 5/20/20
How were the results shared? (i.e. met as a department) We met as a department, and via email.
Who were results shared with? (List names): Robert Hermann, Brent Royuk, John Jurchen, Kristy Jurchen, Marcus Gubanyi, Kent Einspahr, Dennis Brink, Kregg Einspahr, Tim Huntington, Kyle Johnson, Connie Callahan, Jen Fruend.

Discussion of Results –Summarize your conclusions including:

1. **ACTION*-** *How will what the department learned from the assessment impact:*
   a. *Teaching:* We intentionally added more instruction into statistical tools in the past two years, and the results of the assessment showed improvement. We will continue to add more instruction to the courses (many of which are offered only every other year) in order to make sure that students are able to use statistics.
   b. *Assignment/course*: The CS program will probably use a different course next year, one that better matches the question. Physics will continue to emphasize statistics in Phys 382, probably adding another assignment for practice.
   c. *Program:* Based on the results of these assessments over the past few years, the department in Spring 2020 developed a course - Math X22 Statistics for Science - to give intentional, in-depth instruction into statistics

and particularly their application to scientific data. We first offered the course in the Spring of 2020 and we hope to continue to offer the course regularly and see if we detect improvement in this learning outcome.

    d. *Assessment:* None for now; the assessment was meaningful as it was (but we will try to get artifacts from more courses).

2. **IMPACT****-* *What is the anticipated impact of the* **ACTION*** *on student achievement of the learning outcome in the next academic year?* It is hoped that the continued instruction in statistics in science classes, combined with the addition of the Statistics for Science class will help our students be well-prepared for the proper use and interpretation of scientific data.

3. **BUDGET IMPLICATIONS** *– Indicate budget requirements necessary for the successful implementation of the*

ACTION* Depending on loadweight for full-time faculty, we may have to hire an adjunct faculty member to teach the statistics course in the spring, costing about $2400.

If action is taken – it is recommended that the same learning outcome and assessment plan be used for a second assessment cycle.

What assessment questions related to the learning outcome would the program like to investigate in the future? We will assess the same question for another year, in order to see the results of actions taken over the past few years.

Submitted by: Robert Hermann   **Reviewed by the Assessment Committee (date):**
7/14/2020

Department Chair notified approved/additional action needed: 7/14/2020

BUDGET IMPLICATIONS – Assessment Committee Chair notified appropriate Dean: na