



# CHAPMAN UNIVERSITY

## GENERAL EDUCATION: NATURAL SCIENCE INQUIRY ASSESSMENT REPORT 2017-2018

General Information	
General Education Assessment Area	General Education: Natural Science Inquiry
Department/ School	Schmid College of Science and Technology
Number of students currently in the discipline	N/A
Contact Person	
Name <i>(Person coordinating assessment effort)</i>	Chris Kim, Ph.D.
Title	Professor Associate Dean, Academic Programs Schmid College of Science and Technology; Chemistry
E-mail address	cskim@chapman.edu

### **OVERVIEW/DESCRIPTION**

The Natural Science Inquiry (NSI) General Education Shared Inquiry requirement states that “Students will be able to use scientific principles and reasoning as a way of knowing the natural world, distinguishing science from nonscience.”

Students fulfill the NSI requirement by completing one of a range of 3- or 4-credit courses approved by the Schmid College of Science and Technology curriculum committee.

## Learning Outcome Assessment

### I. Process:

<p>1. Student Learning Outcomes</p>	<p><b>NSI Learning Outcomes:</b></p> <ol style="list-style-type: none"> <li>1. Student acknowledges the role, nature and effect of science in their lives.</li> <li>2. Students will demonstrate their understanding of scientific reasoning (methods, theories, and peer-reviewed research).</li> <li>3. Students will understand how to formulate research questions and test hypotheses as part of using the scientific method.</li> </ol>
<p>2. Supports University Theme (Some or all of the program's learning outcomes must support at least two of the university's strategic themes)</p> <ul style="list-style-type: none"> <li>• Themes: <i>Global Citizenship, Personalized Education, Faculty/Student Research, Interdisciplinarity, or Student Writing</i></li> <li>• Describe how the theme is supported by the learning outcome</li> </ul>	<p><u>Global Citizenship:</u> LO#1 addresses the relevance and importance of science to the lives of the students and by translation those of others. This supports the theme of Global Citizenship due to the transferability of scientific processes across nations and cultures.</p> <p><u>Interdisciplinarity:</u> LO#1 and #2 require the comprehension of complex concepts which typically involve multiple disciplines within the sciences.</p> <p><u>Faculty/Student Research:</u> LO#3 asks students to engage in the scientific method and to reason through the process of conducting independent research.</p>
<p>3. Supports WASC Core Competency, For Undergraduate Programs Only (Please indicate whether this outcome supports any of WASC's core competencies)</p> <ul style="list-style-type: none"> <li>• Oral Communication</li> <li>• Written communication</li> <li>• Information Literacy</li> <li>• Quantitative Reasoning</li> <li>• Critical Thinking</li> </ul>	<p><u>Quantitative Reasoning:</u> LO #1 and #2 typically involve quantitative calculations, conversions, and/or derivations to demonstrate scientific concepts and processes.</p> <p><u>Information Literacy:</u> LO#2 involves reading scientific texts and peer-reviewed scientific publications.</p> <p><u>Critical Thinking:</u> LO#3 involves the formulation of scientific questions and development of scientific experiments to test hypotheses, both of which require deep critical thinking.</p>
<p>4. Where is the outcome published for students?</p> <ul style="list-style-type: none"> <li>• Syllabi (If syllabi, list course numbers)</li> <li>• Website</li> <li>• Handbook</li> </ul>	<p>The outcomes are published on the GE website and the Learning at Chapman website.</p>
<p>5. Evidence of Learning</p> <ul style="list-style-type: none"> <li>• capstone project</li> <li>• presentation</li> <li>• performance</li> <li>• course-embedded exam</li> <li>• assignment</li> <li>• standardized test</li> <li>• portfolio</li> </ul>	<p>GE NSI Instructors were instructed to choose an assignment from their courses that would address the NSI Learning Outcome sufficiently (see assessment instructions below). Given the variety of courses in different programs that meet the GE NSI requirement, it was not possible to assign a common assignment. This challenge and requirements for choosing an appropriate assignment were discussed and agreed to during the initial assessment meeting on 2/13/18 with the instructors. As such, there were a variety of assignments chosen for this assessment (see assignment prompts folder).</p> <ul style="list-style-type: none"> <li>• <a href="#">GE NSI Assessment Instruction for Instructors</a></li> <li>• <a href="#">GE NSI Assignment Prompts</a></li> </ul> <p>Three instructors decided to use their exams to assess the NSI Learning Outcome. In order to protect the exams from unauthorized distribution, they are not included in the assignment prompt folder.</p>

6. Collecting and Analyzing the Data

- *How did you select the sample?*
- *What was your sample size (number of students)?*
- *Provide the percentage of the sample size as compared to the relevant population.*
- *How did you assess the student work/data collected?*
  - *Possible Tools: rubric, exam questions, portfolio samples*
  - *Attach all assessment tools*

In Spring 2018, Chapman University offered 18 GE NSI courses (some with multiple sections). These courses are from six programs: Biological Sciences, Chemistry, Food Science, Honors Program, Environmental Science and Policy, and Physics. There were a total of 1377 students enrolled in these courses.

In order to get a representative sample across six programs, we employed a stratified sampling design. From each program, we randomly selected instructors and asked if they would be interested in participating in the GE assessment. Eight instructors teaching 11 sections volunteered to participate in the GE assessment. The 11 course sections are as follows:

Course	Initial Sample	Final Sample
BIOL 102	53	51
BIOL 102	40	38
CHEM 103	22	16
CHEM 150	85	0
ENV 103	66	68
ENV 112	33	29
FSN 200	31	33
FSN 200	29	31
FSN 200	32	31
PHYS 108	47	45
PHYS 108	45	44
<b>Total:</b>	<b>483</b>	<b>386</b>

The initial sample size was 483 students (35.1% of students enrolled for GE NSI). However, during the semester, we identified that some of the offered courses did not have students enrolled to satisfy their GE NSI requirements. In addition, some students added/dropped out of the course or did not attend class during the assessment. As a result, the final sample size was smaller, but still sufficient: 386 (28.0% of students enrolled for GE NSI).

Instructors assessed their chosen assignment (see an explanation for prompt #5 above) using the GE NSI Learning Outcome Rubric (see below). They were instructed to choose an assignment toward the end of the course in order to appropriately assess their knowledge and skills in this GE area.

- [GE NSI Rubric](#)

7. Expected Level of Achievement

- *What was your target(s) for student performance for this outcome? (This should tie to the methods in which you assessed the students and collected and analyzed data in the section above.)*

For each of the three criteria, our target was to achieve a mean score of 2.00 or greater across all participants, indicating adequate levels of proficiency.

II. Performance																					
Have expected levels of achievement been met for this outcome? Explain.	As shown in the data table below, expected levels were met for the three criteria.																				
Please provide a summary of the assessment data in a table, along with a brief analysis of the results.	<p>The GE NSI has three criteria (see GE WI Rubric above). Below are the summary data of these assessment Criteria<sup>1</sup>:</p> <table border="1"> <thead> <tr> <th></th> <th>N</th> <th>Mean</th> <th>SD</th> <th>Below 2</th> </tr> </thead> <tbody> <tr> <td>Criterion 1</td> <td>386</td> <td>2.51</td> <td>0.68</td> <td>33</td> </tr> <tr> <td>Criterion 2</td> <td>386</td> <td>2.18</td> <td>0.79</td> <td>90</td> </tr> <tr> <td>Criterion 3</td> <td>386</td> <td>2.30</td> <td>0.77</td> <td>71</td> </tr> </tbody> </table> <p>For criterion 1 (i.e., Student acknowledges the role, nature and effect of science in their lives): 353 (91.5%) students received a score of 2 or higher. Of the 33 students who received a score below 2, four students received a score of 0, and 29 students received a score of 1.</p> <p>For criterion 2 (i.e., Students will demonstrate their understanding of scientific reasoning - methods, theories, and peer-reviewed research): 296 (76.7%) students received a score of 2 or higher. 90 students received a score of 1.</p> <p>For criterion 3 (i.e., Students will understand how to formulate research questions and test hypotheses as part of using the scientific method): 315 (81.6%) students received a score of 2 or higher. Of the 71 students who received a score below 2, one student received a score of 0, and 70 students received a score of 1.</p> <p>Below is a link to the complete assessment data table:</p> <ul style="list-style-type: none"> <li>• <a href="#">2018 GE NSI Assessment Data</a></li> </ul>		N	Mean	SD	Below 2	Criterion 1	386	2.51	0.68	33	Criterion 2	386	2.18	0.79	90	Criterion 3	386	2.30	0.77	71
	N	Mean	SD	Below 2																	
Criterion 1	386	2.51	0.68	33																	
Criterion 2	386	2.18	0.79	90																	
Criterion 3	386	2.30	0.77	71																	
How will results be shared and evidence used to make decisions? Was it shared with faculty (full time and adjunct) and students?	The results will be shared with the General Education Committee for their review and feedback. Results will be shared back with faculty who participated in this assessment, the dean and other associate/assistant deans in Schmid, and program directors for feedback and input.																				
III. Progress																					
How have previous years' findings been used to improve learning, courses and program in relation to this outcome? Specify. <ul style="list-style-type: none"> <li>• <i>Refer to previous years' assessment reports/responses for this section.</i></li> <li>• <i>How did this year's achievement level compare to past years?</i></li> <li>• <i>Show year-to-year progress, preferably in a data table.</i></li> </ul>	<p>The 2009-2010 and 2010-2011 LOAR for NSI were conducted under different conditions and also suffered from issues relating to sample size, incomplete or inadequate submissions, and legibility of handwritten documents. Thus prior findings were not deemed sufficient as a means of assessment of NSI nor for comparison with the current assessment strategy. Going forward, future assessments will be consistent with this year's process and more effective longitudinal comparisons may be drawn.</p> <ul style="list-style-type: none"> <li>• <a href="#">2011 GE NSI Report</a></li> </ul>																				

<sup>1</sup> Rubric-based score range should be 1-3, however, one instructor also scored zero across the criteria (i.e., four scores of zero for criterion 1; one score of zero for criterion 3).