

Weber State University
Biennial Report on Assessment of Student Learning

Cover Page

Department/Program:
Academic Year of Report: 2019/20 (covering Summer 2017 through Spring 2020)
Date Submitted:
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We have updated the Institutional Effectiveness website, which includes an update for each program page. All Biennial Assessment and Program Review reports will now be available on a single page. Please review your page for completeness and accuracy, and indicate on the list below the changes that need to be made. Access your program page from the top-level [results](#) page. Select the appropriate college and then your program from the subsequent page.

A. Mission Statement

Information is current; no changes required.

Update if not current:

Mission Statement (revised Fall 2019)

The mission of the Department of Chemistry and Biochemistry is to equip our students with the conceptual and experimental foundation to support their goals. Such a foundation is achieved through deep understanding of the chemical basis of matter, in combination with current hands-on practical laboratory skills. The department provides a personalized and accessible learning environment to encourage critical thought, maintain safe and ethical practices, and develop the ability to communicate effectively. First, our mission engages chemistry majors seeking thorough technical knowledge and advanced skills that will enable them to pursue post-graduate studies or employment. Our degree programs include an Applied Associates Chemical Technician degree, ACS Certified Bachelor's degrees (Chemistry and Biochemistry), and a Chemistry Teaching Bachelor's degree. Our students take on undergraduate research opportunities under the direct mentorship of faculty members. The relationships between the faculty and local businesses allow for real-world internship opportunities. Second, our mission supports students in other scientific majors including pre-professional students, by providing molecular context interdisciplinary to life science or other physical sciences. Third, our mission enables non-science majors (general education credit) to attain a basic understanding of chemistry and the scientific method, growing the community's ability to evaluate critically and make informed decisions on issues relating to science, technology, and society. We extend our enthusiasm with the wider community through outreach activities, and through concurrent education opportunities.

B. Student Learning Outcomes

Information is current; no changes required.

Update if not current:

C. Curriculum (please note, we are using Google Sheets for this section so that updates are easier to make)

__ Information is current; no changes required.

Update if not current (you may have access to the Google Sheet if that is easiest, or we can make the updates):

Courses in Department/Program	Department/Program Learning Outcomes				
	Knowledge & Comprehension of the core	Problem Solving Skills	Laboratory Skills	Presentation Skills	Computer Skills
CHEM 1210 Principles of Chemistry I (5)	3	2	2	1	1
CHEM 1220 Principles of Chemistry II (5)	3	2	2	1	1
CHEM 2310/2315 Organic Chemistry I (4/1)	3	2	2	1	1
CHEM 2320/2325 Organic Chemistry II (4/1)	3	2	2	1	1
CHEM 2990 Chemical Technician Seminar (1)					
CHEM 3000 Quantitative Analysis (4)	3	3	3	2	2
CHEM 3020 Computer Applications in Chemistry (1)	3	3	1	1	3
CHEM 3050 Instrumental Analysis (4)	3	3	3	2	2
CHEM 3070/3075 Biochemistry I (4)	3	3	3	1	1
CHEM 3080 Biochemistry II (3)	3	3	1	1	1
CHEM 3090 Biochemistry Techniques (1)	3	3	3	2	2
CHEM 3410 Physical Chemistry I (4)	3	3	3	2	2
CHEM 3610 Foundations in Inorganic Chemistry (4)	3	3	2	1	1
CHEM 4150 Nuclear Magnetic Resonance Spectroscopy (2)	3	3	3	3	3
CHEM 4250 Medicinal Chemistry (3)	3	3	3	3	3
CHEM 4420 Quantum Chemistry (4)	3	3	3	3	3
CHEM 4540 Spectrometric and Separation Methods (4)	3	3	3	2	2
CHEM 4550 Geochemistry (3)					
CHEM 4620 Advanced Inorganic Chemistry (4)	3	3	3	3	1
CHEM 4630 Materials Chemistry (4)	3	3	3	3	1
CHEM 4700 Special Topics in Chemistry (1)	3	1	1	1	1
CHEM 4800 Research and Independent (1)	3	3	2	1	1
CHEM 4990 Senior seminar (1)	3	2	1	3	3

Note: The scale of one to three indicates the extent that the course curriculum is intended to address each Student Learning Outcome. One = minimal, Three = significant. Learning-outcomes will be assessed in courses rated 3 and for some rated 2.

D. Program and Contact Information

 Information is current; no changes required.

Update if not current:

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E. Assessment Plan (please see our website for details on how to develop a [program assessment plan](#))

 Information is current; no changes required.

Update if not current: (this update can be via a Google Sheet if that is easiest; we can then embed the Google Sheet on your program web page, as we do with the curriculum grid)

Learning Outcome	Assessment Measure	When Assessed
1. Knowledge & Comprehension of the core concepts of Chemistry	i. Quizzes, exams, graded homework assignments and laboratory reports. ii. ACS Chemistry Standardized Exam National Scores iii. GRE, DAT, & MCAT Science Scores iv. Graduation Exit Survey	i. Throughout the curriculum ii. End of organic series iii. at graduation iv. at graduation
2. Problem Solving Skills	i. Quizzes, exams, graded homework assignments and laboratory reports. ii. ACS Chemistry Standardized Exam National Scores iii. GRE, DAT, & MCAT Science Scores iv. Graduation Exit Survey	i. Assessed in courses rated 2 or 3 for problem solving skills ii. End of organic series iii. At graduation iv. At graduation

3. Laboratory Skills	<ul style="list-style-type: none"> i. Laboratory technique, notebook, and reports. ii. GRE, DAT, & MCAT Science Scores iii. Graduation Exit Survey 	<ul style="list-style-type: none"> i. Assessed in courses rated 2 or 3 for problem solving skills ii. At graduation iii. At graduation
4. Presentation Skills	<ul style="list-style-type: none"> i. Oral presentations and written reports ii. Graduation Exit Survey 	<ul style="list-style-type: none"> i. Assessed in courses rated 2 or 3 for presentation skills ii. At Graduation
5. Computer Skills	<ul style="list-style-type: none"> i. Quizzes, assignments, and laboratory reports requiring computerized data organization, analysis, and presentation. ii. Graduation Exit Survey 	<ul style="list-style-type: none"> i. Assessed in courses rated 2 or 3 for presentation skills ii. At Graduation

Major courses are evaluated using traditional methods with specific questions on quizzes and exams and focused graded homework assignments and laboratory reports. The American Chemical Society provides exams covering the range of chemistry courses across the undergraduate curriculum. National Exam is administered for organic chemistry courses, Chemistry 2310 and Chemistry 2320, and results are compared to national percentiles. The most recent year's results place the Weber

New: [High Impact Educational Experiences](#) in the Curriculum

In response to the recent USHE requirement that all students have at least 1 HIEE in the first 30 credit hours and 1 HIEE in the major or minor we are asking programs to map HIEEs to curriculum using a traditional curriculum grid. This helps demonstrate how and where these goals are accomplished.

Courses	<u>Department/Program use of High Impact Educational Experiences</u>						
	<u>HIEE 1</u> Evidence-based teaching practices	<u>HIEE 2</u> Supplemental instruction	<u>HIEE 3</u> Team-based learning	<u>HIEE 4</u> Career development	<u>HIEE 5</u> Project-based learning	<u>HIEE 6</u> Undergraduate research	<u>HIEE 7</u> Capstone
CHEM 1210 Principles of Chemistry I (5)	X	X	X				
CHEM 1220 Principles of Chemistry II (5)	X	X	X				
CHEM 2310/2315 Organic Chemistry I (4/1)	X	X	X				
CHEM 2320/2325 Organic Chemistry II (4/1)	X	X	X				
CHEM 2990 Chemical Technician Seminar (1)				X	X		

Courses	Department/Program use of High Impact Educational Experiences						
	<u>HIEE 1</u> Evidence-based teaching practices	<u>HIEE 2</u> Supplemental instruction	<u>HIEE 3</u> Team-based learning	<u>HIEE 4</u> Career development	<u>HIEE 5</u> Project-based learning	<u>HIEE 6</u> Undergraduate research	<u>HIEE 7</u> Capstone
CHEM 3000 Quantitative Analysis (4)					X		
CHEM 3020 Computer Applications in Chemistry (1)					X		
CHEM 3050 Instrumental Analysis (4)					X		
CHEM 3070/3075 Biochemistry I (4)	X		X				
CHEM 3080 Biochemistry II (3)							
CHEM 3090 Biochemistry Techniques (1)			X		X		
CHEM 3410 Physical Chemistry I (4)	X		X				
CHEM 3610 Foundations in Inorganic Chemistry (4)	X		X				
CHEM 4150 Nuclear Magnetic Resonance Spectroscopy (2)					X		
CHEM 4250 Medicinal Chemistry (3)					X		
CHEM 4420 Quantum Chemistry (4)					X		
CHEM 4540 Spectrometric and Separation Methods (4)					X		
CHEM 4550 Geochemistry (3)					X		
CHEM 4620 Advanced Inorganic Chemistry (4)					X		
CHEM 4630 Materials Chemistry (4)					X		
CHEM 4700 Special Topics in Chemistry (1)					X		
CHEM 4800 Research and Independent (1)						X	
CHEM 4990 Senior seminar (1)							X

HIEEs include capstone courses or experiences, community-engaged learning, evidence-based teaching practices, internships, project-based learning, study abroad/away, supplemental instruction, team-based learning, undergraduate research, pre-professional/career development experiences.

Additional information (HIEE planning, assessment, or other information):

F. Report of assessment results since the last report:

There are varieties of ways in which departments can choose to show evidence of learning. This is one example. The critical pieces to include are 1) learning outcome being assessed, 2) method(s) of measurement used, 3) threshold for 'acceptable – that is, the target performance, 4) actual results of the assessment, 5) interpretation/reflection on findings 6) the course of action to be taken based upon the interpretation, and 7) how that action will be evaluated.

A. Evidence of Learning: Courses within the Major

(this is a sample page for purpose of illustration only; a blank template can be found on the next page or at [this site](#))

Sample only - Evidence of Learning: Courses within the Major – Sample only						
Measurable Learning Outcome: Students will...	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1:	Measure 1: A set of 10 multiple choice questions from Exam 1 Measure 2: Student presentations	Measure 1: 85% of students will score 80% or better on 10 questions Measure 2: Using a rubric to assess the presentation, 90% of students will achieve a score of 75% or above.	Measure 1: 93% of students scored 80% or better on 10 questions Measure 2: the threshold was met, but students performed poorly (avg. = 1.8) on one criterion.	Measure 1: Students successfully demonstrated interpretation skills Measure 2: unclear where the issue is	Measure 1: No curricular or pedagogical changes needed at this time Measure 2: provide better explanation of the expectations for this criterion and re-assess.	Analyze the performance on the lower-scoring criterion and determine if clarity of instruction improved student performance.
Learning Outcome 2:	Measure 1: Results of standardized test Measure 2: Students are surveyed about their perceived competence of the outcome	Measure 1: 85% of students will score at or above the national average. Measure 2: On a 5-point Likert scale, 90% of students will indicate 4 or 5	Measure 1: 90% of students scored above national average Measure 2: Less than half of students felt competence with this outcome.	Measure 1: Students successfully demonstrated competence; lowest average score was in transfer of knowledge, where only 69% of questions were answered correctly. Measure 2: Students tested well, but their perceived competence was lower than expected.	Measure 1: Faculty agree to include review of transfer in all related courses; this outcome will be reassessed during next review Measure 2: Students will be given more opportunity to practice this skill with immediate feedback.	

*Can be a mix of [direct](#) and [indirect](#) measures, but at least one measure must be direct

Evidence of Learning Worksheet: **Courses within the Major – Copy as needed (see appendix for alternative format)**

c. Evidence of Learning: General Education Courses

Measurable Learning Outcomes – Physical Science General Education

The Chemistry Department offers multiple chemistry courses that satisfy the requirements for the Weber State University General Education Breadth Requirements for Physical Sciences:

CHEM PS1010 – Introduction to Chemistry

CHEM PS1050 – Introduction to General, Organic, & Biochemistry

CHEM PS1110 – Elementary Chemistry

CHEM PS1210 – Principles of Chemistry

CHEM PS1360 – Principles of Physical Science

These courses satisfy all of the Natural Sciences and Physical Sciences Learning Outcomes:

Foundations of the Natural Sciences Learning Outcomes

After completing the natural sciences general education requirements, students will demonstrate their understanding of general principles of science:

1. Nature of science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.
2. Integration of science. All-natural phenomena are interrelated and shared basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.
3. Science and society. The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.
4. Problem solving and data analysis. Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.

The Physical Sciences Learning Outcomes

Students will demonstrate their understanding of the following features of the physical world:

1. Organization of systems: The universe is scientifically understandable in terms of interconnected systems. The systems evolve over time according to basic physical law.
2. Matter: Matter comprises an important component of the universe, and has physical properties that can be described over a range of scales.
3. Energy: Interactions within the universe can be described in terms of energy exchange and conservation.

4. Forces: Equilibrium and change are determined by forces acting at all organizational levels.

Course: CHEM 1010
30740, 30741)

Semesters taught: Fall 2018 (24523), Fall 2019 (22265, 22266, 24360, 24361), Spr 2020 (30738, 30739,

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	“Close the Loop”
Students will...						
Learning Outcome 1: Nature of science	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	<u>Measure 2: Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2018:</u> Average exam score 69% Students with a Final Grade of C or above: 72% <u>Fall 2019:</u> Average exam score 69% Students with a Final Grade of C or above: 81%	Measure 2: Exams are challenging for the students. Students are already supplied with a study guide to prepare for the exam. Consider adding additional supports for students in this area.	Measure 2: Add a review assignment from the online homework to help students review and prepare for the exams.	

			<u>Spr 2020:</u> Average exam score 81% Students with a Final Grade of C or above: 88%			
	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	
Learning Outcome 2: Integration of science	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1: 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	Measure 2: <u>Measure 2: Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2018:</u> Average exam score 69% Students with a Final Grade of C or above: 72% <u>Fall 2019:</u> Average exam score 69% Students with a Final Grade of C or above: 81% <u>Spr 2020:</u> Average exam score 81%	Measure 2: Exams are challenging for the students. Students are already supplied with a study guide to prepare for the exam. Consider adding additional supports for students in this area.	Measure 2: Add a review assignment from the online homework to help students review and prepare for the exams.	

			Students with a Final Grade of C or above: 88%			
	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	
Learning Outcome 3: Science and society	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1: 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	Measure 2: <u>Measure 2: Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2018:</u> Average exam score 69% Students with a Final Grade of C or above: 72% <u>Fall 2019:</u> Average exam score 69% Students with a Final Grade of C or above: 81% <u>Spr 2020:</u> Average exam score 81% Students with a Final Grade of	Measure 2: Exams are challenging for the students. Students are already supplied with a study guide to prepare for the exam. Consider adding additional supports for students in this area.	Measure 2: Add a review assignment from the online homework to help students review and prepare for the exams.	

			C or above: 88%			
	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	
Learning Outcome 4: Problem solving and data analysis	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	Measure 2: <u>Measure 2: Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2018:</u> Average exam score 69% Students with a Final Grade of C or above: 72% <u>Fall 2019:</u> Average exam score 69% Students with a Final Grade of C or above: 81% <u>Spr 2020:</u> Average exam score 81% Students with a Final Grade of C or above: 88%	Measure 2: Exams are challenging for the students. Students are already supplied with a study guide to prepare for the exam. Consider adding additional supports for students in this area.	Measure 2: Add a review assignment from the online homework to help students review and prepare for the exams.	

	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	
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Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Organization of systems	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	Measure 2: <u>Measure 2: Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2018:</u> Average exam score 69% Students with a Final Grade of C or above: 72% <u>Fall 2019:</u> Average exam score 69% Students with a Final Grade of C or above: 81%	Measure 2: Exams are challenging for the students. Students are already supplied with a study guide to prepare for the exam. Consider adding additional supports for students in this area.	Measure 2: Add a review assignment from the online homework to help students review and prepare for the exams.	

			<u>Spr 2020:</u> Average exam score 81% Students with a Final Grade of C or above: 88%			
	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	
Learning Outcome 2: Matter	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	Measure 2: <u>Measure 2: Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2018:</u> Average exam score 69% Students with a Final Grade of C or above: 72% <u>Fall 2019:</u> Average exam score 69% Students with a Final Grade of C or above: 81% <u>Spr 2020:</u> Average exam score 81%	Measure 2: Exams are challenging for the students. Students are already supplied with a study guide to prepare for the exam. Consider adding additional supports for students in this area.	Measure 2: Add a review assignment from the online homework to help students review and prepare for the exams.	

			Students with a Final Grade of C or above: 88%			
	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	
Learning Outcome 3: Energy	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	Measure 2: <u>Measure 2: Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2018:</u> Average exam score 69% Students with a Final Grade of C or above: 72% <u>Fall 2019:</u> Average exam score 69% Students with a Final Grade of C or above: 81% <u>Spr 2020:</u> Average exam score 81% Students with a Final Grade of	Measure 2: Exams are challenging for the students. Students are already supplied with a study guide to prepare for the exam. Consider adding additional supports for students in this area.	Measure 2: Add a review assignment from the online homework to help students review and prepare for the exams.	

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	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	
Learning Outcome 4: Forces	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	Measure 2: <u>Measure 2: Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2018:</u> Average exam score 69% Students with a Final Grade of C or above: 72% <u>Fall 2019:</u> Average exam score 69% Students with a Final Grade of C or above: 81% <u>Spr 2020:</u> Average exam score 81% Students with a Final Grade of C or above: 88%	Measure 2: Exams are challenging for the students. Students are already supplied with a study guide to prepare for the exam. Consider adding additional supports for students in this area.	Measure 2: Add a review assignment from the online homework to help students review and prepare for the exams.	

	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	
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Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Content Knowledge	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	Measure 2: <u>Measure 2: Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2018:</u> Average exam score 69% Students with a Final Grade of C or above: 72% <u>Fall 2019:</u> Average exam score 69% Students with a Final Grade of C or above: 81%	Measure 2: Exams are challenging for the students. Students are already supplied with a study guide to prepare for the exam. Consider adding additional supports for students in this area.	Measure 2: Add a review assignment from the online homework to help students review and prepare for the exams.	

			<u>Spr 2020:</u> Average exam score 81% Students with a Final Grade of C or above: 88%			
	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	
Learning Outcome 2: Intellectual Tools	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	Measure 2: <u>Measure 2: Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2018:</u> Average exam score 69% Students with a Final Grade of C or above: 72% <u>Fall 2019:</u> Average exam score 69% Students with a Final Grade of C or above: 81% <u>Spr 2020:</u> Average exam score 81%	Measure 2: Exams are challenging for the students. Students are already supplied with a study guide to prepare for the exam. Consider adding additional supports for students in this area.	Measure 2: Add a review assignment from the online homework to help students review and prepare for the exams.	

			Students with a Final Grade of C or above: 88%			
	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	
Learning Outcome 3: Responsibility to Self and Others	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	Measure 2: <u>Measure 2: Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2018:</u> Average exam score 69% Students with a Final Grade of C or above: 72% <u>Fall 2019:</u> Average exam score 69% Students with a Final Grade of C or above: 81% <u>Spr 2020:</u> Average exam score 81% Students with a Final Grade of	Measure 2: Exams are challenging for the students. Students are already supplied with a study guide to prepare for the exam. Consider adding additional supports for students in this area.	Measure 2: Add a review assignment from the online homework to help students review and prepare for the exams.	

			C or above: 88%			
	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	
Learning Outcome 4: Connected & Applied Learning	<u>Measure 1: Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1 60% of students will score 70% or better	Measure 1: <u>Fall 2018:</u> Avg homework score 85% <u>Fall 2019:</u> Avg homework score 83% <u>Spr 2020:</u> Avg homework score 86%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: Continue use of the homeworks. Allow for questions in class to help students connect lecture and homework assignments.	
	<u>Measure 3: Current Event Essays</u> Students complete 7 Current Event essays designed to connect what we are learning in class to the world around them. Topics include Air Quality, Global Warming, Water Quality, Food Irradiation, and Thalidomide	Measure 3: 60% of students will score 70% or better	Measure 3: <u>Fall 2018:</u> Avg score 79% <u>Fall 2019:</u> Avg score 80% <u>Spr 2020:</u> Avg score 83%	Measure 3: Essays are important stepping stones to help students answer the Big Question in our class which is How does understanding chemistry help me become a more well informed citizen? Some topics align better than others.	Measure 3: Consider changing the Food Irradiation and Thalidomide essays to ones that more closely align with the new textbook for Fall 2020	

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Nature of science	Measure 1: 4 midterm exams and final exam (90% multiple choice, 10% written)	Measure 1: 60 – 80 %	Measure 1: Exam medians: 78, 75.7, 71, 83, 76.9	Measure 1: Exams are in target performance range	Measure 1: Continue similar exam assessments	Continue improving exam banks
	Measure 2: ALEKS computer selected homework assignments	Measure 2: 60 -80%	Measure 2: Median assignment score: 57	Measure 2: Homework score is low mostly because several students did not complete all the assigned problems	Measure 2: Encourage students to work problems	Use some class time to review ALEKS problems.
Learning Outcome 2: Integration of science	Measure 1: 4 midterm exams and final exam (90% multiple choice, 10% written)	Measure 1: 60 – 80 %	Measure 1: Exam medians: 78, 75.7, 71, 83, 76.9	Measure 1: Exams are in target performance range	Measure 1: Continue similar exam assessments	Continue improving exam banks
	Measure 2: ALEKS computer selected homework assignments	Measure 2: 60 -80%	Measure 2: Median assignment score: 57	Measure 2: Homework score is low mostly because several students did not complete all the assigned problems	Measure 2: Encourage students to work problems	Use some class time to review ALEKS problems.
Learning Outcome 3: Science and society	Measure 1: 4 midterm exams and final exam (90% multiple choice, 10% written)	Measure 1: 60 – 80 %	Measure 1: Exam medians: 78, 75.7, 71, 83, 76.9	Measure 1: Exams are in target performance range	Measure 1: Continue similar exam assessments	Continue improving exam banks
	Measure 2: ALEKS computer selected homework assignments	Measure 2: 60 -80%	Measure 2: Median assignment score: 57	Measure 2: Homework score is low mostly because several students did not complete all the assigned problems	Measure 2: Encourage students to work problems	Use some class time to review ALEKS problems.
Learning Outcome 4: Problem solving and data analysis	Measure 1: 4 midterm exams and final exam (90%	Measure 1: 60 – 80 %	Measure 1: Exam medians: 78, 75.7, 71, 83, 76.9	Measure 1: Exams are in target performance range	Measure 1: Continue similar exam assessments	Continue improving exam banks

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
	multiple choice, 10% written)					
	Measure 2: ALEKS computer selected homework assignments	Measure 2: 60 -80%	Measure 2: Median assignment score: 57	Measure 2: Homework score is low mostly because several students did not complete all the assigned problems	Measure 2: Encourage students to work problems	Use some class time to review ALEKS problems.

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Organization of systems	Measure 1: 4 midterm exams and final exam (90% multiple choice, 10% written)	Measure 1: 60 – 80 %	Measure 1: Exam medians: 78, 75.7, 71, 83, 76.9	Measure 1: Exams are in target performance range	Measure 1: Continue similar exam assessments	Continue improving exam banks
	Measure 2: ALEKS computer selected homework assignments	Measure 2: 60 -80%	Measure 2: Median assignment score: 57	Measure 2: Homework score is low mostly because several students did not complete all the assigned problems	Measure 2: Encourage students to work problems	Use some class time to review ALEKS problems.
Learning Outcome 2: Matter	Measure 1: 4 midterm exams and final exam (90% multiple choice, 10% written)	Measure 1: 60 – 80 %	Measure 1: Exam medians: 78, 75.7, 71, 83, 76.9	Measure 1: Exams are in target performance range	Measure 1: Continue similar exam assessments	Continue improving exam banks
	Measure 2: ALEKS computer selected homework assignments	Measure 2: 60 -80%	Measure 2: Median assignment score: 57	Measure 2: Homework score is low mostly because several students did not complete all the assigned problems	Measure 2: Encourage students to work problems	Use some class time to review ALEKS problems.

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 3: Energy	Measure 1: 4 midterm exams and final exam (90% multiple choice, 10% written)	Measure 1: 60 – 80 %	Measure 1: Exam medians: 78, 75.7, 71, 83, 76.9	Measure 1: Exams are in target performance range	Measure 1: Continue similar exam assessments	Continue improving exam banks
	Measure 2: ALEKS computer selected homework assignments	Measure 2: 60 -80%	Measure 2: Median assignment score: 57	Measure 2: Homework score is low mostly because several students did not complete all the assigned problems	Measure 2: Encourage students to work problems	Use some class time to review ALEKS problems.
Learning Outcome 4: Forces	Measure 1: 4 midterm exams and final exam (90% multiple choice, 10% written)	Measure 1: 60 – 80 %	Measure 1: Exam medians: 78, 75.7, 71, 83, 76.9	Measure 1: Exams are in target performance range	Measure 1: Continue similar exam assessments	Continue improving exam banks
	Measure 2: ALEKS computer selected homework assignments	Measure 2: 60 -80%	Measure 2: Median assignment score: 57	Measure 2: Homework score is low mostly because several students did not complete all the assigned problems	Measure 2: Encourage students to work problems	Use some class time to review ALEKS problems.

The signature assignment was to write a 4-page paper with at least 6 references on a topic from the Big Question. The Big Question was: "What is the nature of matter, and how can matter be manipulated to improve human life quality?" Students could choose a topic from the following list, or make up one of their own:

1. What is truth to a scientist? How is it discovered, verified, and refined? How does it differ from political, religious, law, or social science truth?
2. Why are accuracy and precision important when measuring numbers? How do they affect progress on products and projects?
3. What unit systems often need to be interconverted in calculations? What are conversion factors. How is it useful to use dimensional analysis to solve unit conversion problems?
4. Describe the meaning of terminology related to matter descriptions – for examples: pure substances, mixtures, composition, phases, etc.
5. Describe what atoms and molecules are. How do these concepts explain physical phenomena in the real world? Why do some elements have similar properties to other elements?
6. What are the common subatomic particles? Describe how their properties were discovered, and why they are important.
7. What are chemical bonds? How is chemical bonding related to the electron arrangement in atoms? What are compounds?
8. What differences exist between synthetic and natural compounds? Should society be concerned about artificial (synthetic) dietary products?
9. Name six common household chemicals or products? What chemicals do they contain (write chemical formulas)? Which ones are covalent (molecular) and which are ionic. Describe their uses, hazards, and environmental impacts.

10. What is energy? What forms does it take? How is it measured? What are cohesive and disruptive forces?
11. When carrying out a chemical reaction, how do chemists know the correct amounts of reactant materials to add such that reactants will be completely consumed (none left over)?
12. Describe solid, liquid, and gaseous states in terms of the Kinetic Molecular Theory of Matter. How does each physical state differ at the microscopic level?
13. A similar topic of your choice. You should review your idea with the instructor before beginning work on it.

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Nature of science	Measure 1: Results of Quiz 1, question 1: Sequence of steps in the scientific method. (Fall 2018/Spring 2019)	Measure 1: Greater than 60% answer question correctly.	Measure 1: 89% answered this question correctly.	Measure 1: Class performance exceeded set standard.	Measure 1: No change needed.	
Learning Outcome 2: Integration of science	Measure 1: Results of Quiz 13, question 1: What is the solvent of our atmosphere? (Fall 2018/Spring 2019)	Measure 1: Greater than 60% answer question correctly.	Measure 1: 91% answered correctly	Measure 1: Class performance exceeded set standard.	Measure 1: No change needed.	
Learning Outcome 3: Science and society	Measure 1: Results of Quiz 21, question 4: Identify each of the greenhouse gases. (Fall 2018/Spring 2019)	Measure 1: Greater than 60% answer question correctly.	Measure 1: 58% answered question correctly.	Measure 1: Class performance fell just short of standard.	Measure 1: The question had multiple answers. Greater emphasis on water being a greenhouse gas.	
Learning Outcome 4: Problem solving and data analysis	Measure 1: Results of Quiz 13, question 3: How many moles in 30g sodium chloride? (Fall 2018/Spring 2019)	Measure 1: Greater than 60% answer question correctly.	Measure 1: 73% answered question correctly.	Measure 1: Class performance exceeded set standard.	Measure 1: No change needed.	

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Organization of systems	Measure 1: Results of Quiz 4, question 3: Which of the following elements is most like sulfur? (Fall 2018/Spring 2019)	Measure 1: Greater than 60% answer question correctly.	Measure 1: 62% answered question correctly.	Measure 1: Class performance exceeded set standard.	Measure 1: No change needed.	
Learning Outcome 2: Matter	Measure 1: Results of Quiz 3, question 2: Which term describes the phase transition of solid to gas? (Fall 2018/Spring 2019)	Measure 1: Greater than 60% answer question correctly.	Measure 1: 88% answered question correctly.	Measure 1: Class performance exceeded set standard.	Measure 1: No change needed.	
Learning Outcome 3: Energy	Measure 1: Results of Quiz 16, question 1: Identify all processes that are exothermic. (Fall 2018/Spring 2019)	Measure 1: Greater than 60% answer question correctly.	Measure 1: 54% answered question correctly	Measure 1: Class performance fell just short of standard.	Measure 1: Once again, this question had multiple answers to identify as correct. Emphasize breaking bonds requires energy.	
Learning Outcome 4: Forces	Measure 1: Results of Quiz 8, question 2: Select all of the following that are true of the strong nuclear force. (Fall 2018/Spring 2019)	Measure 1: Greater than 60% answer question correctly.	Measure 1: 32% answered question correctly	Measure 1: Class score was significantly lower than the set standard.	Measure 1: Question required selecting multiple correct answers.	Students understood the forces were effective between proton and neutron at short distance, but no between neutron & neutron.

General Education Signature Assignment Essay from Walker's Chem 1050 Fall19

Question:

Is it good or bad that we burn ethanol as a fuel?

Signature Assignment:

For more than a decade, the US government has required that ethyl alcohol be added to gasoline. Many scientific and ethical issues are related to this practice. Automotive fuel must contain specific concentrations of ethanol, a renewable cellulosic biofuel. The intent was to reduce dependence on foreign oil and reduce environmentally harmful emissions.

During this semester, we will discuss many aspects of this question.

- ☐ What is alcohol?
- ☐ Where does it come from?
- ☐ How is it produced?
- ☐ What is the annual consumption of ethanol as a fuel?
- ☐ Does it reduce harmful emissions?
- ☐ How does it affect our food chain?
- ☐ Who benefits from its use in fuels?
- ☐ Should we continue to burn ethanol as a fuel?

Write a 2-3-page persuasive essay describing your thoughts on this issue. You must choose one side of this issue, (Is burning ethanol as a fuel "good" or "bad?") Using the information learned in our course and your own personal study, support your thesis. Provide authoritative sources for your information, describe the chemical reactions and products of burning ethanol, and cite research supporting your ideas. Persuade your readers to join you on your side of this issue. This is not a simple, 1-hour, Google copy-and-paste assignment. Rather, it is an opportunity for you to apply the concepts learned in our course and blend them with your own opinions. There is no right or wrong answer. Grades will be based upon your organized expression of your ideas and how you support them. A few students with opposing viewpoints will be invited to present their papers in class, to stimulate discussion of this topic towards the end of the semester. Good luck!

Points: 50

Results:

Students responded well to this first-time assignment required by our Gen Ed committee at WSU. Three examples were chosen by me at random and included in this report. (As appendices). It was fun to discuss their views in class towards the end of the semester.

General Education Independent Evaluation of this Signature Assignment is also attached (Email May 14, 2020).

General Education Signature Assignment Essay from Walker's Chem 1050 Fall19

Question:

Is it good or bad that we burn ethanol as a fuel?

Signature Assignment:

For more than a decade, the US government has required that ethyl alcohol be added to gasoline. Many scientific and ethical issues are related to this practice. Automotive fuel must contain specific concentrations of ethanol, a renewable cellulosic biofuel. The intent was to reduce dependence on foreign oil and reduce environmentally harmful emissions.

During this semester, we will discuss many aspects of this question.

- ☐ What is alcohol?
- ☐ Where does it come from?
- ☐ How is it produced?

Report due 11/15/2020

- ☒ What is the annual consumption of ethanol as a fuel?
- ☒ Does it reduce harmful emissions?
- ☒ How does it affect our food chain?
- ☒ Who benefits from its use in fuels?
- ☒ Should we continue to burn ethanol as a fuel?

Write a 2-3-page persuasive essay describing your thoughts on this issue. You must choose one side of this issue, (Is burning ethanol as a fuel “good” or “bad?”) Using the information learned in our course and your own personal study, support your thesis. Provide authoritative sources for your information, describe the chemical reactions and products of burning ethanol, and cite research supporting your ideas. Persuade your readers to join you on your side of this issue. This is not a simple, 1-hour, Google copy-and-paste assignment. Rather, it is an opportunity for you to apply the concepts learned in our course and blend them with your own opinions. There is no right or wrong answer. Grades will be based upon your organized expression of your ideas and how you support them. A few students with opposing viewpoints will be invited to present their papers in class, to stimulate discussion of this topic towards the end of the semester. Good luck!

Points: 50

Results:

Students responded well to this first-time assignment required by our Gen Ed committee at WSU. Three examples were chosen by me at random and included in this report. (As appendices). It was fun to discuss their views in class towards the end of the semester.

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Nature of science	Measure 1: <u>Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1: 60% of students will score 70% or better	Measure 1: <u>Fall 2017</u> : Avg homework score 87% <u>Spring 2018</u> : Avg homework score 89% <u>Summer 2018</u> : Avg homework score 87% <u>Fall 2018</u> : Avg homework score 83% <u>Spring 2019</u> : Avg homework score 84% <u>Fall 2019</u> : Avg homework score 87% <u>Spring 2020</u> : Avg homework score 83%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: No changes needed at this time.	Analyze time spent to determine if concepts could be deepened for better understanding
	Measure 2: <u>Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2017</u> : Average exam scores 63% Students with Final Grade of C or above: 84% <u>Spring 2018</u> : Average exam score 62% Students with a Final Grade of C or above: 72%	Measure 2: LearnSmart reading and Connect homework assignments encourage participation. Consider possibility of exam review worksheet to make the concepts stick.	Measure 2: Reassess exam preparation.	Review exams for questions with high correct response and those with low correct response to identify most difficult issues.

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...	Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4		<u>Summer 2018:</u> Average exam score 63% Students with a Final Grade of C or above: 81% <u>Fall 2018:</u> Avg exam score 61% Students with a final grade of C or better 76% <u>Spring 2019:</u> Avg exam score 59% Students with a Final grade of C or better 68% <u>Fall 2019:</u> Avg exam score 66% Students with a final grade of C or better 73% <u>Spring 2020:</u> Avg exam score 74% Students with a final grade of C or better 85%			
Learning Outcome 2: Integration of science	Measure 1: <u>Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1: 60% of students will score 70% or better	Measure 1: <u>Fall 2017:</u> Avg homework score 87% <u>Spring 2018:</u> Avg homework score 89% <u>Summer 2018:</u> Avg homework score 87% <u>Fall 2018:</u>	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: No changes needed at this time.	Analyze time spent to determine if concepts could be deepened for better understanding

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...			Avg homework score 83% <u>Spring 2019:</u> Avg homework score 84% <u>Fall 2019:</u> Avg homework score 87% <u>Spring 2020:</u> Avg homework score 83%			
	Measure 2: <u>Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2017:</u> Average exam scores 63% Students with Final Grade of C or above: 84% <u>Spring 2018:</u> Average exam score 62% Students with a Final Grade of C or above: 72% <u>Summer 2018:</u> Average exam score 63% Students with a Final Grade of C or above: 81% <u>Fall 2018:</u> Avg exam score 61% Students with a final grade of C or better 76% <u>Spring 2019:</u> Avg exam score 59% Students	Measure 2: LearnSmart reading and Connect homework assignments encourage participation. Consider possibility of exam review worksheet to make the concepts stick.	Measure 2: Reassess exam preparation.	Review exams for questions with high correct response and those with low correct response to identify most difficult issues.

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...			with a Final grade of C or better 68% <u>Fall 2019:</u> Avg exam score 66% Students with a final grade of C or better 73% <u>Spring 2020:</u> Avg exam score 74% Students with a final grade of C or better 85%			
Learning Outcome 3: Science and society	Measure 1: <u>Homework</u> One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	Measure 1: 60% of students will score 70% or better	Measure 1: <u>Fall 2017:</u> Avg homework score 87% <u>Spring 2018:</u> Avg homework score 89% <u>Summer 2018:</u> Avg homework score 87% <u>Fall 2018:</u> Avg homework score 83% <u>Spring 2019:</u> Avg homework score 84% <u>Fall 2019:</u> Avg homework score 87% <u>Spring 2020:</u> Avg homework score 83%	Measure 1: LearnSmart reading and Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	Measure 1: No changes needed at this time.	Analyze time spent to determine if concepts could be deepened for better understanding
	Measure 2: <u>Exams</u> Based on content in ACS Chemistry in	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2017:</u> Average exam scores 63%	Measure 2: LearnSmart reading and Connect homework	Measure 2: Reassess exam preparation.	Review exams for questions with high correct response and

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
	Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2 Exam 3 Exam 4		Students with Final Grade of C or above: 84% <u>Spring 2018:</u> Average exam score 62% Students with a Final Grade of C or above: 72% <u>Summer 2018:</u> Average exam score 63% Students with a Final Grade of C or above: 81% <u>Fall 2018:</u> Avg exam score 61% Students with a final grade of C or better 76% <u>Spring 2019:</u> Avg exam score 59% Students with a Final grade of C or better 68% <u>Fall 2019:</u> Avg exam score 66% Students with a final grade of C or better 73% <u>Spring 2020:</u> Avg exam score 74% Students with a final grade of C or better 85%	assignments encourage participation. Consider possibility of exam review worksheet to make the concepts stick.		those with low correct response to identify most difficult issues.
Learning Outcome 4:	Measure 1: <u>Homework</u>	Measure 1:	Measure 1: <u>Fall 2017:</u>	Measure 1: LearnSmart reading and	Measure 1:	Analyze time spent to determine if

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Problem solving and data analysis	One homework set per chapter, and one reading quiz per chapter. These are reflected as the homework scores.	60% of students will score 70% or better	Avg homework score 87% <u>Spring 2018:</u> Avg homework score 89% <u>Summer 2018:</u> Avg homework score 87% <u>Fall 2018:</u> Avg homework score 83% <u>Spring 2019:</u> Avg homework score 84% <u>Fall 2019:</u> Avg homework score 87% <u>Spring 2020:</u> Avg homework score 83%	Connect homework assignments encourage participation. Online homework system has been effective in practicing concepts.	No changes needed at this time.	concepts could be deepened for better understanding
	Measure 2: <u>Exams</u> Based on content in ACS Chemistry in Context: The Periodic Table/Electronics; Air, Radiation from the Sun, Climate Change, Water, Energy from Combustion, Energy from Alternative Sources, Polymers, Food and Nutrition, Health and Medicine Exam 1 Exam 2	Measure 2: 60% of students will score 70% or better	Measure 2: <u>Fall 2017:</u> Average exam scores 63% Students with Final Grade of C or above: 84% <u>Spring 2018:</u> Average exam score 62% Students with a Final Grade of C or above: 72% <u>Summer 2018:</u> Average exam score 63% Students with a Final Grade of C or above: 81%	Measure 2: LearnSmart reading and Connect homework assignments encourage participation. Consider possibility of exam review worksheet to make the concepts stick.	Measure 2: Reassess exam preparation.	Review exams for questions with high correct response and those with low correct response to identify most difficult issues.

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...	Exam 3 Exam 4		<u>Fall 2018:</u> Avg exam score 61% Students with a final grade of C or better 76% <u>Spring 2019:</u> Avg exam score 59% Students with a Final grade of C or better 68% <u>Fall 2019:</u> Avg exam score 66% Students with a final grade of C or better 73% <u>Spring 2020:</u> Avg exam score 74% Students with a final grade of C or better 85%			

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Nature of science	Measure 1: Students learn chemical concepts related to medical care: %(w/v), Molarity, Normality (equivalents/L), osmolarity.	Measure 1: Students prepare solutions of various concentrations and analyze them by titration and other methods in lab. They also perform calculations involving %, M, N in homework and exams. 80% of students successfully complete these activities.	Measure 1: Student lab reports and lecture exams are evaluated. Example copies of student work are kept on file.	Measure 1: Each student's submitted assignments and exams are analyzed to determine if the objectives are being achieved. 80% of the students will achieve a minimum score of 70% on this assignment.	Measure 1: If less than 80% of the students in the course are not reaching a minimum of 70% on each of the %, M, N and 80% of Measure 2, extra lecture time and more emphasis will be given to the topics covered in the one or more of the respective skills.	
	Measure 2: Students learn how to name chemical compounds.	Measure 2: Students name inorganic acids, bases, and salts as well as organic compounds. 80% of students successfully complete these tests and assignments.	Measure 2: Student programs and resulting reports are collected and analyzed. Example electronic copies of their work are retained.	Measure 2: Each student's submitted assignments and exams are analyzed to determine if the objectives are being achieved. 80% of the students will achieve a minimum score of 70% on this assignment.	Measure 2: If less than 80% of the students in the course are not reaching a minimum of 70% on each of the inorganic and organic naming exams and 80% of Measure 2, extra lecture time and emphasis are given.	
Learning Outcome 2: Integration of science	Measure 1: Students learn about barometric pressure and partial pressure of oxygen affects	Measure 1: 80% of students successfully learn how Dalton's law of partial pressures functions to	Measure 1: Student-homework and exams are collected and analyzed. Example copies of student	Measure 1: Each student's assignments covering partial pressure are analyzed to	Measure 1: If less than 80% of the students in the course are not reaching a minimum of 70%	Students in this section clearly understood barometric pressure and Dalton's law of

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
	respiration in humans.	determine available oxygen for clinical settings. Homework assignments and exams measure student mastery.	work are kept on file.	determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	for their related assignments, extra lecture time and more emphasis will be given to the topics.	partial pressures as evidence by their exam scores.
	Measure 2: Students apply acid-base chemistry to understand how to enhance the solubility of alkaloid drugs.	Measure 2: 80% of students successfully learn that protonation of organic amines dramatically increases solubility of drugs. Homework assignments and exams measure student mastery.	Measure 2: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 2: Each student's assignments regarding protonation of organic amines are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 2: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	Over 80% of the students in this course intend to become nurses. Over 90% of them understood the importance of converting alkaloid drugs such as morphine to the HCl salt to enhance their solubility.
Learning Outcome 3: Science and society	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	
	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	
Learning Outcome 4: Problem solving and data analysis	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	
	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Organization of systems	Measure 1: Students learn electronic organization and communication skills by preparing and submitting electronic reports in a completely paperless environment.	Measure 1: 100% of students will successfully submit at least 90% of all assignment and lab reports electronically.	Measure 1: Students create electronic images of their reports and submit (paperless) reports electronically. The instructor grades these; example copies are maintained on file.	Measure 1: Each student's electronic submission is analyzed and each student is expected to achieve a minimum score of 90% on this activity.	Measure 1: Any student who does not submit reports electronically is tutored personally to help them accomplish this goal.	Students enhanced their skills in electronic organization and communication throughout the semester. Their assignments and lab activities all improved in format and organization.
	Measure 2: Students learn the highly-organized nature of chemical bonds and how this applies to all molecular substances in nature.	Measure 2: 80% of students successfully apply the octet rule to describe how atoms combine to form molecules. Homework and exams measure student mastery.	Measure 2: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 2: Each student's assignments regarding chemical bonding are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 2: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	Students understood the concept of the octet rule, valence electrons, as well as covalent and ionic bonding.
Learning Outcome 2: Matter	Measure 1: Students learn the three primary states of matter: gases, liquids, and solids.	Measure 1: 80% of students successfully describe these states and interconversion between them. Homework and exams measure student mastery.	Measure 1: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 1: Each student's assignments regarding states of matter and are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of	Measure 1: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be	Students clearly understood the three states of matter and the conversions of gas>liquid> gas. However, I will be working harder to teach the concept of sublimation (solid>gas),

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...				70% on each assignment.	given to the topics.	since students did not meet the minimum on this assessment measure.
	Measure 2: Students learn the periodic table and how it can be used to understand the behavior of elements.	Measure 2: 80% of students successfully predict metals and non-metals and their periodic repetitive behavior. Homework and exams measure student mastery.	Measure 2: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 2: Each student's assignments regarding the periodic table are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 2: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	Every student enhanced their working knowledge of the periodic table.
Learning Outcome 3: Energy	Measure 1: Students learn about exothermic and endothermic reactions.	Measure 1: 80% of students successfully describe exothermic and endothermic reactions. Homework and exams measure student mastery.	Measure 1: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 1: Each student's assignments regarding exothermic and endothermic reactions and are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 1: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	More than 80% of my students clearly understood the concept of exo- and endo-thermic reactions as evidenced by their exam questions.
	Measure 2: Students learn about the kinetic nature of matter.	Measure 2: 80% of students successfully understand kinetic nature of matter.	Measure 2: Student-homework and exams are collected and analyzed. Example	Measure 2: Each student's assignments regarding the kinetic nature of	Measure 2: If less than 80% of the students in the course are not reaching a	Students developed a clear understanding of the kinetic

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...		Homework and exams measure student mastery.	copies of student work are kept on file.	matter and are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	nature of matter and how this related to temperature (in Kelvins)
Learning Outcome 4: Forces	Measure 1: Students learn about intermolecular forces with special emphasis on hydrogen bonding.	Measure 1: 80% of students successfully describe intermolecular forces. Homework and exams measure student mastery.	Measure 1: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 1: Each student's assignments regarding intermolecular forces and are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 1: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	I will be working harder to teach this next semester. This group of students did not understand hydrogen bonding as well as students in prior courses.
	Measure 2: Students learn the highly-organized nature of chemical bonds and how this applies to all molecular substances in nature.	Measure 2: 80% of students successfully apply the octet rule to describe how atoms combine to form molecules. Homework and exams measure student mastery.	Measure 2: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 2: Each student's assignments regarding chemical bonding are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 2: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	My students clearly understood the differences between ionic and covalent bonding.

General Education (GELO) brief description of the Big Question and Signature Assignment.

*At least one measure per objective must be a direct measure; indirect measures may be used to supplement direct measure(s).

It is proposed that these assessment results will be reviewed by the General Education Improvement & Assessment Committee, who will provide feedback on evidence of continuous improvement.

Additional narrative (optional – use as much space as needed):

BIG QUESTION: *Is it good or bad that we burn ethanol as a fuel?*

I asked my Chem 1050 course to write a 2-3-page persuasive essay describing their thoughts on this issue.

“You must choose one side of this issue, (Is burning ethanol as a fuel “good” or “bad?”) Using the information learned in our course and your own personal study, support your thesis. Provide authoritative sources for your information, describe the chemical reactions and products of burning ethanol, and cite research supporting your ideas. Persuade your readers to join you on your side of this issue.”

Students responded in an excellent manner, the majority of whom picked a position and supported it well with concepts learned in our course and from their own personal readings. A complete evaluation of this question was done by the Gen Ed committee (May 14, 2020).

General Education Independent Evaluation of this Signature Assignment is also attached (Email May 14, 2020).

Course: CHEM 1050

Semester taught:

Fall 2019

Sections included:

1

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Nature of science	Measure 1: Students learn chemical concepts related to medical care: %(w/v), Molarity, Normality (equivalents/L), osmolarity.	Measure 1: Students prepare solutions of various concentrations and analyze them by titration and other methods in lab. They also perform calculations involving %, M, N in homework and exams. 80% of students successfully complete these activities.	Measure 1: Student lab reports and lecture exams are evaluated. Example copies of student work are kept on file.	Measure 1: Each student's submitted assignments and exams are analyzed to determine if the objectives are being achieved. 80% of the students will achieve a minimum score of 70% on this assignment.	Measure 1: If less than 80% of the students in the course are not reaching a minimum of 70% on each of the %, M, N and 80% of Measure 2, extra lecture time and more emphasis will be given to the topics covered in the one or more of the respective skills.	
	Measure 2: Students learn how to name chemical compounds.	Measure 2: Students name inorganic acids, bases, and salts as well as organic compounds. 80% of students successfully complete these tests and assignments.	Measure 2: Student programs and resulting reports are collected and analyzed. Example electronic copies of their work are retained.	Measure 2: Each student's submitted assignments and exams are analyzed to determine if the objectives are being achieved. 80% of the students will achieve a minimum score of 70% on this assignment.	Measure 2: If less than 80% of the students in the course are not reaching a minimum of 70% on each of the inorganic and organic naming exams and 80% of Measure 2, extra lecture time and emphasis are given.	
Learning Outcome 2:	Measure 1: Students learn about barometric	Measure 1: 80% of students successfully learn	Measure 1: Student-homework and exams are	Measure 1: Each student's assignments	Measure 1: If less than 80% of the students in	Students in this section clearly understood

Report due 11/15/2020

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Integration of science	pressure and partial pressure of oxygen affects respiration in humans.	how Dalton's law of partial pressures functions to determine available oxygen for clinical settings. Homework assignments and exams measure student mastery.	collected and analyzed. Example copies of student work are kept on file.	covering partial pressure are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	barometric pressure and Dalton's law of partial pressures as evidence by their exam scores.
	Measure 2: Students apply acid-base chemistry to understand how to enhance the solubility of alkaloid drugs.	Measure 2: 80% of students successfully learn that protonation of organic amines dramatically increases solubility of drugs. Homework assignments and exams measure student mastery.	Measure 2: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 2: Each student's assignments regarding protonation of organic amines are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 2: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	Over 80% of the students in this course intend to become nurses. Over 90% of them understood the importance of converting alkaloid drugs such as morphine to the HCl salt to enhance their solubility.
Learning Outcome 3: Science and society	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	
	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	
Learning Outcome 4: Problem solving and data analysis	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	Measure 1: Not applicable	
	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	Measure 2: Not applicable	

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Organization of systems	Measure 1: Students learn electronic organization and communication skills by preparing and submitting electronic reports in a completely paperless environment.	Measure 1: 100% of students will successfully submit at least 90% of all assignment and lab reports electronically.	Measure 1: Students create electronic images of their reports and submit (paperless) reports electronically. The instructor grades these; example copies are maintained on file.	Measure 1: Each student's electronic submission is analyzed and each student is expected to achieve a minimum score of 90% on this activity.	Measure 1: Any student who does not submit reports electronically is tutored personally to help them accomplish this goal.	Students enhanced their skills in electronic organization and communication throughout the semester. Their assignments and lab activities all improved in format and organization.
	Measure 2: Students learn the highly-organized nature of chemical bonds and how this applies to all molecular substances in nature.	Measure 2: 80% of students successfully apply the octet rule to describe how atoms combine to form molecules. Homework and exams measure student mastery.	Measure 2: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 2: Each student's assignments regarding chemical bonding are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 2: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	Students understood the concept of the octet rule, valence electrons, as well as covalent and ionic bonding.
Learning Outcome 2: Matter	Measure 1: Students learn the three primary states of matter: gases, liquids, and solids.	Measure 1: 80% of students successfully describe these states and interconversion between them. Homework and exams measure student mastery.	Measure 1: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 1: Each student's assignments regarding states of matter and are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of	Measure 1: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be	Students clearly understood the three states of matter and the conversions of gas>liquid> gas. However, I will be working harder to teach the concept of sublimation (solid>gas),

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...				70% on each assignment.	given to the topics.	since students did not meet the minimum on this assessment measure.
	Measure 2: Students learn the periodic table and how it can be used to understand the behavior of elements.	Measure 2: 80% of students successfully predict metals and non-metals and their periodic repetitive behavior. Homework and exams measure student mastery.	Measure 2: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 2: Each student's assignments regarding the periodic table are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 2: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	Every student enhanced their working knowledge of the periodic table.
Learning Outcome 3: Energy	Measure 1: Students learn about exothermic and endothermic reactions.	Measure 1: 80% of students successfully describe exothermic and endothermic reactions. Homework and exams measure student mastery.	Measure 1: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 1: Each student's assignments regarding exothermic and endothermic reactions and are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 1: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	More than 80% of my students clearly understood the concept of exo- and endo-thermic reactions as evidenced by their exam questions.
	Measure 2: Students learn about the kinetic nature of matter.	Measure 2: 80% of students successfully understand kinetic nature of matter.	Measure 2: Student-homework and exams are collected and analyzed. Example	Measure 2: Each student's assignments regarding the kinetic nature of	Measure 2: If less than 80% of the students in the course are not reaching a	Students developed a clear understanding of the kinetic

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...		Homework and exams measure student mastery.	copies of student work are kept on file.	matter and are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	nature of matter and how this related to temperature (in Kelvins)
Learning Outcome 4: Forces	Measure 1: Students learn about intermolecular forces with special emphasis on hydrogen bonding.	Measure 1: 80% of students successfully describe intermolecular forces. Homework and exams measure student mastery.	Measure 1: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 1: Each student's assignments regarding intermolecular forces and are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 1: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	I will be working harder to teach this next semester. This group of students did not understand hydrogen bonding as well as students in prior courses.
	Measure 2: Students learn the highly-organized nature of chemical bonds and how this applies to all molecular substances in nature.	Measure 2: 80% of students successfully apply the octet rule to describe how atoms combine to form molecules. Homework and exams measure student mastery.	Measure 2: Student-homework and exams are collected and analyzed. Example copies of student work are kept on file.	Measure 2: Each student's assignments regarding chemical bonding are analyzed to determine if the objectives are being achieved. Each student will achieve a minimum score of 70% on each assignment.	Measure 2: If less than 80% of the students in the course are not reaching a minimum of 70% for their related assignments, extra lecture time and more emphasis will be given to the topics.	My students clearly understood the differences between ionic and covalent bonding.

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Additional narrative (optional – use as much space as needed):

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I asked my Chem 1050 course to write a 2-3-page persuasive essay describing their thoughts on this issue.

“You must choose one side of this issue, (Is burning ethanol as a fuel “good” or “bad?”) Using the information learned in our course and your own personal study, support your thesis. Provide authoritative sources for your information, describe the chemical reactions and products of burning ethanol, and cite research supporting your ideas. Persuade your readers to join you on your side of this issue.”

Students responded in an excellent manner, the majority of whom picked a position and supported it well with concepts learned in our course and from their own personal readings. A complete evaluation of this question was done by the Gen Ed committee (May 14, 2020).

Evidence of Learning Worksheet: **General Education Courses**

Course: Intro Gen, Organic, & Bio Slabaugh, Francis, Aprill

Course CHEM 1050 Summer 2020					
Evidence of Learning: General Education Area - Foundations of the Natural Science Learning Outcomes					
Measurable Learning Outcome	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Students will understand...					
1) Nature of science	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 81% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.
2) Integration of science	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 76% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.
3) Science and society	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 73% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.
4) Problem solving and data analysis	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 74% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.
Evidence of Learning: General Education Area - The Physical Sciences Learning Outcomes					
1) Organization of systems	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 84% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.
2) Matter	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 74% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.
3) Energy	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 81% of students answered the questions correctly.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.
4) Forces	Measure 1: Summer 2020 Exam question	Measure 1:	Measure 1:	Measure 1:	Measure 1:

		70% of students respond correctly to the question.	75% of students respond correctly to the question.	Students successfully demonstrated understanding.	No curricular or pedagogical changes needed at this time.	
Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome Students will...	Method of Measurement	Target Performance 70% of students respond correctly to the question.	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	“Close the Loop”
Learning Outcome 1: Content Knowledge	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 78% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.	
Learning Outcome 2: Intellectual Tools	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 78% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.	
Learning Outcome 3: Responsibility to Self and Others	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 79% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.	
Learning Outcome 4: Connected & Applied Learning	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: Measure 1: 82% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.	

*At least one measure per objective must be a direct measure; indirect measures may be used to supplement direct measure(s).

It is proposed that these assessment results will be reviewed by the General Education Improvement & Assessment Committee, who will provide feedback on evidence of continuous improvement.

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Nature of science	Measure 1: Spring 2020 Exams 1 and 2	Measure 1: Average Score of 70% or better	Measure 1: Student Average was 86%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time.	
Learning Outcome 2: Integration of science	Measure 1: Spring 2020 Unit exams and Final Exam	Measure 1: Average Score of 70% or better	Measure 1: Student Average was 85%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time.	
Learning Outcome 3: Science and society	Measure 1: Discussion Posts	Measure 1: Average Score of 70% or better	Measure 1: Student Average was 94%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time.	
Learning Outcome 4: Problem solving and data analysis	Measure 1: Exams 1, 2, and 3	Measure 1: Average Score of 70% or better	Measure 1: Student Average was 86%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time.	
	Measure 2: Lab Reports	Measure 2: Average Score of 70% or better	Measure 2: Student Average was 82%	Measure 2: Students successfully demonstrated skills	Measure 2: No curricular or pedagogical changes needed at this time.	

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Organization of systems	Measure 1: Exam 1, 3, and 4	Measure 1: Average Score of 70% or better	Measure 1: Student Average was 85%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time.	

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 2: Matter	Measure 1: Exam 1	Measure 1: Average Score of 70% or better	Measure 1: Student Average was 90%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time.	
	Measure 2: Lab 1 Report	Measure 2: Average Score of 70% or better	Measure 2: Student Average was 92%	Measure 2: Students successfully demonstrated skills	Measure 2: No curricular or pedagogical changes needed at this time.	
Learning Outcome 3: Energy	Measure 1: Exam 2 and 4	Measure 1: Average Score of 70% or better	Measure 1: Student Average was 85%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time.	
Learning Outcome 4: Forces	Measure 1: Exams 2 and 3	Measure 1: Average Score of 70% or better	Measure 1: Student Average was 85%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time.	

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Content Knowledge	Measure 1: Unit Exams and Final Exam	Measure 1: Average Score of 70% or better	Measure 1: Student Average was 85%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time.	
	Measure 2: Labs	Measure 2: Average Score of 70% or better	Measure 2: Student Average was 82%	Measure 2: Students successfully demonstrated skills	Measure 2: No curricular or pedagogical changes needed at this time.	
	Measure 1:	Measure 1:	Measure 1:	Measure 1:	Measure 1:	

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 2: Intellectual Tools	Unit Exams and Final Exam	Average Score of 70% or better	Student Average was 85%	Students successfully demonstrated skills	No curricular or pedagogical changes needed at this time.	
	Measure 2: Labs	Measure 2: Average Score of 70% or better	Measure 2: Student Average was 82%	Measure 2: Students successfully demonstrated skills	Measure 2: No curricular or pedagogical changes needed at this time.	
Learning Outcome 3: Responsibility to Self and Others	Measure 1: Discussion Posts	Measure 1: Average Score of 70% or better	Measure 1: Student Average was 94%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time.	
	Measure 2: Labs	Measure 2: Average Score of 70% or better	Measure 2: Student Average was 82%	Measure 2: Students successfully demonstrated skills	Measure 2: No curricular or pedagogical changes needed at this time.	
Learning Outcome 4: Connected & Applied Learning	Measure 1: Discussions Posts	Measure 1: Average Score of 70% or better	Measure 1: Student Average was 94%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time.	

*At least one measure per objective must be a direct measure; indirect measures may be used to supplement direct measure(s).

It is proposed that these assessment results will be reviewed by the General Education Improvement & Assessment Committee, who will provide feedback on evidence of continuous improvement.

Additional narrative (optional – use as much space as needed):

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Nature of science	Measure 1 Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn an average of 70% or greater.	Measure 1: <u>Fall 2017:</u> Average 85% <u>Spring 2018:</u> Average 81% <u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	Measure 1: Labs are a successful and positive hands-on learning experience.	Measure 1: No change.	Review the labs for any improvements
	Measure 2: Chapter Exams (13 exams), supported by on-line homework (unlimited attempts as a study tool) <u>Chapter Topics</u> Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry, Saturated Hydrocarbons, Unsaturated Hydrocarbons	Measure 2: 70% of students earn an average of 70% or greater.	Measure 2: <u>Fall 2017:</u> Average 72%. 75% of Students had a Final Grade of C or better. <u>Spring 2018:</u> Average 69%. 72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%. 90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%. 94% of students had a final grade of C or better.	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals and different levels of preparation. LearnSmart reading assignments/quizzes, and Connect on-line homework have been effective.	Review the exams for effectiveness of questions
Learning Outcome 2:	Measure 1: Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn	Measure 1: <u>Fall 2017:</u> Average 85%	Measure 1: Labs are a successful	Measure 1: No change.	Review the labs for any improvements

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Integration of science		an average of 70% or greater.	<u>Spring 2018:</u> Average 81% <u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	and positive hands-on learning experience.		
	Measure 2: Chapter Exams (13 exams), supported by on-line homework (unlimited attempts as a study tool) <u>Chapter Topics</u> Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry, Saturated Hydrocarbons, Unsaturated Hydrocarbons	Measure 2: 70% of students earn an average of 70% or greater.	Measure 2: <u>Fall 2017:</u> Average 72%. 75% of Students had a Final Grade of C or better. <u>Spring 2018:</u> Average 69%. 72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%. 90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%. 94% of students had a final grade of C or better.	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals and different levels of preparation. LearnSmart reading assignments/quizzes, and Connect on-line homework have been effective.	Review the exams for effectiveness of questions
Learning Outcome 3: Science and society	Measure 1: Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn an average of 70% or greater.	Measure 1: <u>Fall 2017:</u> Average 85% <u>Spring 2018:</u> Average 81% <u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	Measure 1: Labs are a successful and positive hands-on learning experience.	Measure 1: No change.	Review the labs for any improvements

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...	Measure 2: Chapter Exams (13 exams), supported by on-line homework (unlimited attempts as a study tool) <u>Chapter Topics</u> Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry, Saturated Hydrocarbons, Unsaturated Hydrocarbons	Measure 2: 70% of students earn an average of 70% or greater.	Measure 2: <u>Fall 2017:</u> Average 72%. 75% of Students had a Final Grade of C or better. <u>Spring 2018:</u> Average 69%. 72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%. 90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%. 94% of students had a final grade of C or better.	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals and different levels of preparation. LearnSmart reading assignments/quizzes, and Connect on-line homework have been effective.	Review the exams for effectiveness of questions
Learning Outcome 4: Problem solving and data analysis	Measure 1: Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn an average of 70% or greater.	Measure 1: <u>Fall 2017:</u> Average 85% <u>Spring 2018:</u> Average 81% <u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	Measure 1: Labs are a successful and positive hands-on learning experience.	Measure 1: No change.	Review the labs for any improvements
	Measure 2: Chapter Exams (13 exams), supported by on-line homework (unlimited attempts as a study tool)	Measure 2: 70% of students earn an average of 70% or greater.	Measure 2: <u>Fall 2017:</u> Average 72%. 75% of Students had a Final Grade of C or better. <u>Spring 2018:</u> Average 69%.	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals and different levels	Review the exams for effectiveness of questions

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
	Chapter Topics Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry, Saturated Hydrocarbons, Unsaturated Hydrocarbons		72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%. 90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%. 94% of students had a final grade of C or better.		of preparation. LearnSmart reading assignments/quizzes, and Connect on-line homework have been effective.	

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Organization of systems	Measure 1: Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn an average of 70% or greater.	Measure 1: <u>Fall 2017:</u> Average 85% <u>Spring 2018:</u> Average 81% <u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	Measure 1: Labs are a successful and positive hands-on learning experience.	Measure 1: No change.	Review the labs for any improvements
	Measure 2: Chapter Exams (13 exams), supported by on-line homework	Measure 2: 70% of students earn an average of 70% or greater.	Measure 2: <u>Fall 2017:</u> Average 72%.	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals	Review the exams for effectiveness of questions

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...	(unlimited attempts as a study tool) <u>Chapter Topics</u> Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry, Saturated Hydrocarbons, Unsaturated Hydrocarbons		75% of Students had a Final Grade of C or better. <u>Spring 2018:</u> Average 69%. 72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%. 90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%. 94% of students had a final grade of C or better.		and different levels of preparation. LearnSmart reading assignments/quizzes, and Connect on-line homework have been effective.	
Learning Outcome 2: Matter	Measure 1: Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn an average of 70% or greater.	Measure 1: <u>Fall 2017:</u> Average 85% <u>Spring 2018:</u> Average 81% <u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	Measure 1: Labs are a successful and positive hands-on learning experience.	Measure 1: No change.	Review the labs for any improvements

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...	<p>Measure 2: Chapter Exams (13 exams), supported by on-line homework (unlimited attempts as a study tool)</p> <p><u>Chapter Topics</u> Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry, Saturated Hydrocarbons, Unsaturated Hydrocarbons</p>	Measure 2: 70% of students earn an average of 70% or greater.	<p>Measure 2: <u>Fall 2017:</u> Average 72%. 75% of Students had a Final Grade of C or better. <u>Spring 2018:</u> Average 69%. 72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%. 90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%. 94% of students had a final grade of C or better.</p>	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals and different levels of preparation. LearnSmart reading assignments/quizzes, and Connect on-line homework have been effective.	Review the exams for effectiveness of questions
Learning Outcome 3: Energy	Measure 1: Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn an average of 70% or greater.	Measure 1: <u>Fall 2017:</u> Average 85% <u>Spring 2018:</u> Average 81%	Measure 1: Labs are a successful and positive hands-on	Measure 1: No change.	Review the labs for any improvements

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...			<u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	learning experience.		
	Measure 2: Chapter Exams (13 exams), supported by on-line homework (unlimited attempts as a study tool) <u>Chapter Topics</u> Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry, Saturated Hydrocarbons, Unsaturated Hydrocarbons	Measure 2: 70% of students earn an average of 70% or greater.	Measure 2: <u>Fall 2017:</u> Average 72%. 75% of Students had a Final Grade of C or better. <u>Spring 2018:</u> Average 69%. 72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%. 90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%. 94% of students had a final grade of C or better.	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals and different levels of preparation. LearnSmart reading assignments/quizzes, and Connect on-line homework have been effective.	Review the exams for effectiveness of questions

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 4: Forces	Measure 1: Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn an average of 70% or greater.	Measure 1: <u>Fall 2017:</u> Average 85% <u>Spring 2018:</u> Average 81% <u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	Measure 1: Labs are a successful and positive hands-on learning experience.	Measure 1: No change.	Review the labs for any improvements
	Measure 2: Chapter Exams (13 exams), supported by on-line homework (unlimited attempts as a study tool) <u>Chapter Topics</u> Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry,	Measure 2: 70% of students earn an average of 70% or greater.	Measure 2: <u>Fall 2017:</u> Average 72%. 75% of Students had a Final Grade of C or better. <u>Spring 2018:</u> Average 69%. 72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%. 90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%. 94% of students had a final grade of C or better.	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals and different levels of preparation. LearnSmart reading assignments/quizzes, and Connect on-line homework have been effective.	Review the exams for effectiveness of questions

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
	Saturated Hydrocarbons, Unsaturated Hydrocarbons					

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Content Knowledge	Measure 1: Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn an average of 70% or greater.	Measure 1: <u>Fall 2017:</u> Average 85% <u>Spring 2018:</u> Average 81% <u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	Measure 1: Labs are a successful and positive hands-on learning experience.	Measure 1: No change.	Review the labs for any improvements
	Measure 2: Chapter Exams (13 exams), supported by on-line homework (unlimited attempts as a study tool) <u>Chapter Topics</u> Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical	Measure 2: 70% of students earn an average of 70% or greater.	Measure 2: <u>Fall 2017:</u> Average 72%. 75% of Students had a Final Grade of C or better. <u>Spring 2018:</u> Average 69%. 72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%. 90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%.	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals and different levels of preparation. LearnSmart reading assignments/quizzes, and Connect on-line homework have been effective.	Review the exams for effectiveness of questions

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
	Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry, Saturated Hydrocarbons, Unsaturated Hydrocarbons		94% of students had a final grade of C or better.			
Learning Outcome 2: Intellectual Tools	Measure 1: Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn an average of 70% or greater.	Measure 1: <u>Fall 2017:</u> Average 85% <u>Spring 2018:</u> Average 81% <u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	Measure 1: Labs are a successful and positive hands-on learning experience.	Measure 1: No change.	Review the labs for any improvements
	Measure 2: Chapter Exams (13 exams), supported by on-line homework (unlimited attempts as a study tool) <u>Chapter Topics</u> Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the	Measure 2: 70% of students earn an average of 70% or greater.	Measure 2: <u>Fall 2017:</u> Average 72%. 75% of Students had a Final Grade of C or better. <u>Spring 2018:</u> Average 69%. 72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%.	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals and different levels of preparation. LearnSmart reading assignments/quizzes, and Connect on-line homework have been effective.	Review the exams for effectiveness of questions

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...	Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry, Saturated Hydrocarbons, Unsaturated Hydrocarbons		90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%. 94% of students had a final grade of C or better.			
Learning Outcome 3: Responsibility to Self and Others	Measure 1: Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn an average of 70% or greater.	Measure 1: <u>Fall 2017:</u> Average 85% <u>Spring 2018:</u> Average 81% <u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	Measure 1: Labs are a successful and positive hands-on learning experience.	Measure 1: No change.	Review the labs for any improvements
	Measure 2: Chapter Exams (13 exams), supported by on-line homework (unlimited attempts as a study tool) <u>Chapter Topics</u>	Measure 2: 70% of students earn an average of 70% or greater.	Measure 2: <u>Fall 2017:</u> Average 72%. 75% of Students had a Final Grade of C or better. <u>Spring 2018:</u> Average 69%.	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals and different levels of preparation. LearnSmart reading assignments/quizzes, and Connect on-line	Review the exams for effectiveness of questions

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
	Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry, Saturated Hydrocarbons, Unsaturated Hydrocarbons		72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%. 90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%. 94% of students had a final grade of C or better.		homework have been effective.	
Learning Outcome 4: Connected & Applied Learning	Measure 1: Laboratory Experience: Prelabs and Lab Reports (12 labs)	Measure 1: 70% of students earn an average of 70% or greater.	Measure 1: <u>Fall 2017:</u> Average 85% <u>Spring 2018:</u> Average 81% <u>Spring 2019:</u> Average 86% <u>Spring 2020:</u> Average 84%	Measure 1: Labs are a successful and positive hands-on learning experience.	Measure 1: No change.	Review the labs for any improvements
	Measure 2: Chapter Exams (13 exams), supported by on-line homework (unlimited	Measure 2: 70% of students earn an average of 70% or greater.	Measure 2: <u>Fall 2017:</u> Average 72%. 75% of Students had a Final Grade of C or better.	Measure 2: Overall class averages are on target.	Measure 2: Class contains a broad cross-section of students with differing career goals and different levels	Review the exams for effectiveness of questions

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...	attempts as a study tool) <u>Chapter Topics</u> Basic Concepts about Matter; Measurements in Chemistry; Atomic Structure and the Periodic Table; The Ionic Bond Model; The Covalent Bond Model; Chemical Calculations: Formula Masses, Moles, and Chemical Equations; Gases, Liquids, and Solids, Solutions; Chemical Reactions; Acids, Bases and Salts; Nuclear Chemistry, Saturated Hydrocarbons, Unsaturated Hydrocarbons		<u>Spring 2018:</u> Average 69%. 72% of Students had a Final Grade of C or better. <u>Spring 2019:</u> Average 80%. 90% of students had a final grade of C or better. <u>Spring 2020:</u> Average 78%. 94% of students had a final grade of C or better.		of preparation. LearnSmart reading assignments/quizzes, and Connect on-line homework have been effective.	

Evidence of Learning Worksheet: **General Education Courses**

Course: General, Organic, and Biochemistry 1st semester Slabaugh, Francis, Aprill

Course CHEM 1110 Summer 2020					
Evidence of Learning: General Education Area - Foundations of the Natural Science Learning Outcomes					
Measurable Learning Outcome	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Students will...					
1) The nature of science	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 83% of students respond correctly to the question.	Measure 1: Students successfully demonstrated competence.	Measure 1: No curricular or pedagogical changes needed at this time.
2) The integration of science	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 75% of students respond correctly to the question.	Measure 1: Students successfully demonstrated competence.	Measure 1: No curricular or pedagogical changes needed at this time.
3) Science and society	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 78% of students respond correctly to the question.	Measure 1: Students successfully demonstrated competence.	Measure 1: No curricular or pedagogical changes needed at this time.
4) Problem solving and data analysis	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 76% of students respond correctly to the question.	Measure 1: Students successfully demonstrated competence.	Measure 1: No curricular or pedagogical changes needed at this time.
Evidence of Learning: General Education Area - The Physical Sciences Learning Outcomes					
1) Organization of systems	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 83% of students respond correctly to the question.	Measure 1: Students successfully demonstrated competence.	Measure 1: No curricular or pedagogical changes needed at this time.
2) Matter	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 76% of students respond correctly to the question.	Measure 1: Students successfully demonstrated competence.	Measure 1: No curricular or pedagogical changes needed at this time.
3) Energy	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 74% of students respond correctly to the question.	Measure 1: Students successfully demonstrated competence.	Measure 1: No curricular or pedagogical changes needed at this time.
4) Forces	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 80% of students respond correctly to the question.	Measure 1: Students successfully demonstrated competence.	Measure 1: No curricular or pedagogical changes needed at this time.

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Content Knowledge	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 79% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.	
Learning Outcome 2: Intellectual Tools	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 81% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.	
Learning Outcome 3: Responsibility to Self and Others	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 83% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.	
Learning Outcome 4: Connected & Applied Learning	Measure 1: Summer 2020 Exam question	Measure 1: 70% of students respond correctly to the question.	Measure 1: 80% of students respond correctly to the question.	Measure 1: Students successfully demonstrated understanding.	Measure 1: No curricular or pedagogical changes needed at this time.	

Course: CHEM 1210

Semester taught: SPR18,19,20

Sections included:

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Nature of Science	Measure 1: One multiple choice exam question	Measure 1: 80% of students will correctly answer the multiple-choice question.	Measure 1: 98% of students correctly answered this question.	Measure 1: An acceptable percentage of students correctly answered the questions.	No change.	n/a
	Measure 2:	Measure 2:	Measure 2:	Measure 2:	No change.	n/a

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
	Survey question on Final exam	85% of students will strongly agree or agree with the learning outcome.	96% of students strongly agree or agree with the learning outcome.	An acceptable percentage of students agree with the learning outcome.		
Learning Outcome 2: Integration of Science	Measure 1: Homework questions.	Measure 1: 80% of students will correctly answer the short answer homework questions.	Measure 1: 93% of students did correctly answer the short answer homework questions.	Measure 1: An acceptable percentage of students correctly answered the questions.	No change.	n/a
	Measure 2: Survey question on Final exam	Measure 2: 85% of students will strongly agree or agree with the learning outcome.	Measure 2: 98% of students strongly agree or agree with the learning outcome.	Measure 2: An acceptable percentage of students agree with the learning outcome.	No change.	

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 3: Science and Society	Measure 1: Signature assessment essay question.	Measure 1: 80% of students will correctly answer the multiple-choice question.	Measure 1: 99% of students will correctly answer the multiple-choice question.	Measure 1: An acceptable percentage of students correctly answered the question.	No change.	
	Measure 2: Survey question on Final exam	Measure 2: 85% of students will strongly agree or agree with the learning outcome.	Measure 2: 85% of students will strongly agree or agree with the learning outcome.	Measure 2: An acceptable percentage of students agree with the learning outcome.	No change.	
Learning Outcome 4: Problem Solving and Data Analysis	Measure 1: Lab Report 4	Measure 1: The average lab report score will be greater than 80%.	Measure 1: The average lab report score was 88%.	Measure 1: The average lab report score exceeded the desirable average score.	No change.	
	Measure 2: Survey question on Final exam	Measure 2: 85% of students will strongly agree or agree with the learning outcome.	Measure 2: 98% of students strongly agree or agree with the learning outcome.	Measure 2: An acceptable percentage of students agree with the learning outcome.	No change.	

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 5: Organization of Systems	Measure 1:	Measure 1:	Measure 1:	Measure 1:		
	Measure 2: Survey question on Final exam	Measure 2: 85% of students will strongly agree or agree with the learning outcome.	Measure 2: 94% of students strongly agree or agree with the learning outcome.	Measure 2: An acceptable percentage of students agree with the learning outcome.	No change.	
Learning Outcome 6: Matter	Measure 1: One multiple choice exam question	Measure 1: 80% of students will correctly answer the multiple-choice question.	Measure 1: 99% of students correctly answered this question.	Measure 1: An acceptable percentage of students correctly answered the question.	No change	
	Measure 2: Survey question on Final exam	Measure 2: 85% of students will strongly agree or agree with the learning outcome.	Measure 2: 98% of students strongly agree or agree with the learning outcome.	Measure 2: An acceptable percentage of students agree with the learning outcome.	No change.	

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 7: Energy	Measure 1: Four multiple choice exam questions	Measure 1: 80% of students will correctly answer the multiple-choice questions.	Measure 1: 80% of students correctly answered these questions.	Measure 1: An acceptable percentage of students correctly answered the questions.	No change.	
	Measure 2: Survey question on Final exam	Measure 2: 85% of students will strongly agree or agree with the learning outcome.	Measure 2: 100% of students strongly agree or agree with the learning outcome.	Measure 2: An acceptable percentage of students agree with the learning outcome.	No change.	
Learning Outcome 8: Forces	Measure 1: Three homework questions.	Measure 1: 80% of students will correctly answer the short answer homework questions.	Measure 1: 96% of students correctly answered the short answer homework questions.	Measure 1: An acceptable percentage of students correctly answered the questions	No change.	
	Measure 2: Survey question on Final exam	Measure 2: 85% of students will strongly agree or agree with the learning outcome.	Measure 2: 100% of students strongly agree or agree with the learning outcome.	Measure 2: An acceptable percentage of students agree with the learning outcome.	No change.	

*Direct and indirect: at least one measure per objective must be a direct measure.

Additional narrative (optional – use as much space as needed):

c. Evidence of Learning: General Education Courses

(Area-specific EOL grids can be found at [http://weber.edu/oie/Complete Rubrics.html](http://weber.edu/oie/Complete_Rubrics.html); they can replace this page.)

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Nature of science	Measure 1: Fall 2019 Exam 1 questions	Measure 1: Average score of 70% or better	Measure 1: Student average was 75%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 2: Integration of science	Measure 1: Fall 2019 Assessed over 7 units exams	Measure 1: Average score of 70% or better	Measure 1: Student average was 77% over all semester exams	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 3: Science and society	Measure 1: Fall 2019 Prelab and Lab report 5	Measure 1: Average score of 70% or better	Measure 1: Student average was 90%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 4: Problem solving and data analysis	Measure 1: Fall 2019 Assessed over 7 units exams and lab reports	Measure 1: Average score of 70% or better	Measure 1: Student average was 77% over all semester exams	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Organization of systems	Measure 1: Fall 2019 Exams 2 and 3	Measure 1: Average of 70% or better	Measure 1: Student average was 76.5%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 2: Matter	Measure 1: Fall 2019 Unit exam 3, 4, 5	Measure 1: Average score of 70% or better	Measure 1: Student average was 74.6%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 3: Energy	Measure 1: Fall 2019 Unit exam 3, 4, 5	Measure 1: Average score of 70% or better	Measure 1: Student average was 74.6%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 4: Forces	Measure 1: Fall 2019 Lab report 7, exams 3, 4, & 5 and final exam	Measure 1: Average score of 70% or better	Measure 1: Student average was 79%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Content Knowledge	Measure 1: Fall 2019 Assessed over 7 units exams and final	Measure 1: Average score of 70% or better	Measure 1: Student average was 77% over all semester exams	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 2: Intellectual Tools	Measure 1: Fall 2019 Lab Group Reports and Post-Lab Reports	Measure 1: Average score of 70% or better	Measure 1: Student average was 81%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 3: Responsibility to Self and Others	Measure 1: Fall 2019 Lab Group Reports	Measure 1: Average score of 70% or better	Measure 1: Student average was 94%	Measure 1: Students successfully demonstrated skills	Measure 1: Create other measures of assessing this GELO	
	Measure 2: Fall 2019 Lab Final/Signature Assignment	Measure 2: Average score of 70% or better	Measure 2: Student average was 72%	Measure 2: Students successfully demonstrated skills	Measure 2: Create other measures of assessing this GELO	

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 4: Connected & Applied Learning	Measure 1: Fall 2019 Unit exams and final exam	Measure 1: Average score of 70% or better	Measure 1: Student average was 74%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
	Measure 2: Fall 2019 Lab Group Reports and Post-Lab Reports	Measure 2: Average score of 70% or better	Measure 2: Student average was 81%	Measure 2: Students successfully demonstrated skills	Measure 2: No curricular or pedagogical changes needed at this time	

*At least one measure per objective must be a direct measure; indirect measures may be used to supplement direct measure(s). It is proposed that these assessment results will be reviewed by the General Education Improvement & Assessment Committee, who will provide feedback on evidence of continuous improvement.

Evidence of Learning: General Education Foundations of the Natural Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Nature of science	Measure 1: Fall 2019 Exam 1 and final exam	Measure 1: Average score of 70% or better	Measure 1: Student average was 76%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 2: Integration of science	Measure 1: Fall 2019 Unit exams and final exam	Measure 1: Average score of 70% or better	Measure 1: Student average was 74%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 3: Science and society	Measure 1: Fall 2019 Prelab and Lab report 5, and exam 3	Measure 1: Average score of 70% or better	Measure 1: Student average was 89%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 4: Problem solving and data analysis	Measure 1: Fall 2019 Lab reports and final exam	Measure 1: Average score of 70% or better	Measure 1: Student average was 79%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Organization of systems	Measure 1: Fall 2019 Exams 1&2 and final exam	Measure 1: Average of 70% or better	Measure 1: Student average was 74%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 2: Matter	Measure 1: Fall 2019 Unit exams and final exam	Measure 1: Average score of 70% or better	Measure 1: Student average was 74%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	

Evidence of Learning: General Education The Physical Sciences						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 3: Energy	Measure 1: Fall 2019 Exam 2 & 3 and final exam	Measure 1: Average score of 70% or better	Measure 1: Student average was 72%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 4: Forces	Measure 1: Fall 2019 Lab report 7, exams 3, 4, & 5 and final exam	Measure 1: Average score of 70% or better	Measure 1: Student average was 80%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 1: Content Knowledge	Measure 1: Fall 2019 Unit exams and final exam	Measure 1: Average score of 70% or better	Measure 1: Student average was 74%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 2: Intellectual Tools	Measure 1: Fall 2019 Lab Group Reports and Post-Lab Reports	Measure 1: Average score of 70% or better	Measure 1: Student average was 81%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
Learning Outcome 3: Responsibility to Self and Others	Measure 1: Fall 2019 Lab Group Reports	Measure 1: Average score of 70% or better	Measure 1: Student average was 94%	Measure 1: Students successfully demonstrated skills	Measure 1: Create other measures of assessing this GELO	
	Measure 2: Fall 2019 Lab Final/Signature Assignment	Measure 2: Average score of 70% or better	Measure 2: Student average was 72%	Measure 2: Students successfully demonstrated skills	Measure 2: Create other measures of assessing this GELO	

Evidence of Learning: General Education (GELO)						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Students will...						
Learning Outcome 4: Connected & Applied Learning	Measure 1: Fall 2019 Unit exams and final exam	Measure 1: Average score of 70% or better	Measure 1: Student average was 74%	Measure 1: Students successfully demonstrated skills	Measure 1: No curricular or pedagogical changes needed at this time	
	Measure 2: Fall 2019 Lab Group Reports and Post-Lab Reports	Measure 2: Average score of 70% or better	Measure 2: Student average was 81%	Measure 2: Students successfully demonstrated skills	Measure 2: No curricular or pedagogical changes needed at this time	

*At least one measure per objective must be a direct measure; indirect measures may be used to supplement direct measure(s). It is proposed that these assessment results will be reviewed by the General Education Improvement & Assessment Committee, who will provide feedback on evidence of continuous improvement.

Appendix A

Most departments or programs receive a number of recommendations from their Five/Seven-Year Program Review processes. This page provides a means of updating progress towards the recommendations the department/program is enacting.

Date of Program Review: 2012	Recommendation	Progress Description
Recommendation 1	Text of recommendation	#### +1 progress
		#### +2 progress
		#### +3 progress
		#### +4 progress
Recommendation 2	Text of recommendation	#### +1 progress
		#### +2 progress
		#### +3 progress
		#### +4 progress
Recommendation 3	Text of recommendation	#### +1 progress
		#### +2 progress
		#### +3 progress
		#### +4 progress
(add as needed)		

Additional narrative:

Department programs are currently under review. This section will be updated for the current review the next biennial assessment report.

Appendix B

Please provide the following information about the full-time *and adjunct faculty* contracted by your department during the last academic year (summer through spring). Gathering this information each year will help with the headcount reporting that must be done for the final Five-Year Program Review document that is shared with the State Board of Regents.

Faculty Headcount	2017-18	2018-19	2019-20
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)			
Full-time Tenured		10	11
Full-time Non-Tenured (includes tenure-track)		1	1
Part-time and adjunct		1	1
With Master's Degrees			
Full-time Tenured			
Full-time Non-Tenured		1	1
Part-time and adjunct		1	1
With Bachelor's Degrees			
Full-time Tenured			
Full-time Non-tenured			
Part-time and adjunct		2	2
Other			
Full-time Tenured			
Full-time Non-tenured			
Part-time			
Total Headcount Faculty			
Full-time Tenured			11
Full-time Non-tenured			2
Part-time			4

Appendix C – alternative format for Evidence of Learning Reporting; this can be in table form or as a narrative.

Course:

Program Outcome 1	
Aligned Course Outcome(s):	
Method(s) of measurement:	
Target Performance:	
Actual Performance:	
Interpretation/Reflection on findings:	
Action Plan/Use of Results:	
Intended evaluation of plan (closing the loop):	

Please respond to the following questions.

1) First year student success is critical to WSU's retention and graduation efforts. We are interested in finding out how departments support their first-year students. Do you have mechanisms and processes in place to identify, meet with, and support first-year students? Please provide a brief narrative focusing on your program's support of new students:

a. **Any** first-year students taking courses in your program(s)

Hundreds of students enroll in service courses offered by the department each year and individual advising by the department chair (advisor) is not feasible. Faculty members teaching service courses invite all students to participate in office hours and welcome questions regarding future coursework, course success, etc.

b. Students declared in your program(s), whether or not they are taking courses in your program(s)

All students wishing to declare a major in one of the department's programs meet with the department chair (advisor) to receive personalized advising, review program requirements, plan coursework associated with the major for the coming year, and get answers to their questions. Students are then matched with faculty members based on their expressed interests, who act as principle advisors for the student's remaining time in the program. Students are also welcome at any time to consult with the department chair and other faculty to get answers to specific questions. The department admin maintains a list of current majors and shares information of potential interest such as seminars, internships, research opportunities, etc, as they are announced. Majors are invited to an annual seminar each fall (food provided) where faculty briefly introduce themselves and their research interests.

2) A key component of sound assessment practice is the process of 'closing the loop' – that is, following up on changes implemented as a response to your assessment findings, to determine the impact of those changes/innovations. It is also an aspect of assessment on which we need to improve, as suggested in our NWCCU mid-cycle report. Please describe the processes your program has in place to 'close the loop'.

Closing the loop processes are under development in the department.

Glossary

Student Learning Outcomes/Measurable Learning Outcomes

The terms 'learning outcome', 'learning objective', 'learning competency', and 'learning goal' are often used interchangeably. Broadly, these terms reference what we want students to be able to do AFTER they pass a course or graduate from a program. For this document, we will use the word 'outcomes'. Good learning outcomes are specific (but not too specific), are observable, and are clear. Good learning outcomes focus on skills: knowledge and understanding; transferrable skills; habits of mind; career skills; attitudes and values.

- Should be developed using action words (if you can see it, you can assess it).
- Use compound statements judiciously.
- Use complex statements judiciously.

Curriculum Grid

A chart identifying the key learning outcomes addressed in each of the curriculum's key elements or learning experiences (Suskie, 2019). A good curriculum:

- Gives students ample, diverse opportunities to achieve core learning outcomes.
- Has appropriate, progressive rigor.
- Concludes with an integrative, synthesizing capstone experience.
- Is focused and simple.
- Uses research-informed strategies to help students learn and succeed.
- Is consistent across venues and modalities.
- Is greater than the sum of its parts.

Target Performance (previously referred to as 'Threshold')

The level of performance at which students are doing well enough to succeed in later studies (e.g., next course in sequence or next level of course) or career.

Actual Performance

How students performed on the specific assessment. An average score is less meaningful than a distribution of scores (for example, 72% of students met or exceeded the target performance, 5% of students failed the assessment).

Closing the Loop

The process of following up on changes made to curriculum, pedagogy, materials, etc., to determine if the changes had the desired impact.

Continuous Improvement

An idea with roots in manufacturing, that promotes the ongoing effort to improve. Continuous improvement uses data and evidence to improve student learning and drive student success.

Direct evidence

Evidence based upon actual student work; performance on a test, a presentation, or a research paper, for example. Direct evidence is tangible, visible, and measurable.

Indirect evidence

Evidence that serves as a proxy for student learning. May include student opinion/perception of learning, course grades, measures of satisfaction, participation. Works well as a complement to direct evidence.

HIEE – High Impact Educational Experiences

Promote student learning through curricular and co-curricular activities that are intentionally designed to foster active and integrative student engagement by utilizing multiple impact strategies. Please see <https://weber.edu/weberthrives/HIEE.html>