Degree Program Student Learning Report

Revised August 2017

Department of Mathematics & Physical Sciences

AS in Physical Science

For 2017-2018 Academic Year

PART 1

Degree Program Mission and Student Learning Outcomes

A. State the school, department, and degree program missions.

University Mission	School Mission	Department Mission	Degree Program Mission
Our mission is to ensure students develop the skills and knowledge required to achieve professional and personal goals in dynamic local and global communities.	Central to the mission of the School is the preparation of students to achieve professional and personal goals in their respective disciplines and to enable their success in dynamic local and global communities. Our strategy is to foster an academic setting of diverse curricula that inherently incorporates an environment of service and collegiality.	The mission of the Department of Mathematics and Physical Sciences at Rogers State University is to support students in their pursuit of knowledge in mathematics and physical science.	The Associate of Science in Physical Science consists of general education curriculum and courses supporting other departmental programs. In support of the mission of the university, the school, and the department, the degree seeks to provide a solid general education component for all university students, provide curriculum in the physical sciences for students who are preparing for a baccalaureate-granting program, and provide programs of study to students presently in the work force, allowing them the opportunity to continue their education.

B. Align school purposes, department purposes, and program student learning outcomes with their appropriate University commitments.

University Commitments	School Purposes	Department Purposes	Student Learning Outcomes
To provide quality associate, baccalaureate, and graduate degree opportunities and educational experiences which foster student excellence in oral and written communications, scientific reasoning and critical and creative thinking.	The School offers innovative degrees, which focus upon developing skills in oral and written communication, critical thinking, creativity, empirical and evidenced-based inquiry, experimental investigation and theoretical explanation of natural phenomena, and innovative technology.	1. To increase the student's critical thinking and reasoning abilities.	1a. Demonstrate a thorough knowledge and understanding of basic physical science principles and their applications (outcome meets in two different department purposes – 1a and 5a). 1b. Apply problem solving skills through critical thinking and scientific methods (meets in 1b and 2b).
		2. To increase the student's understanding and appreciation of the physical world, and the ability to apply this understanding in his/her personal and professional life.	2a. Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data (meets in 2a, 3b, and 4a). 2b. Apply problem solving skills through critical thinking and scientific methods (meets in 1b and 2b).
		3. To increase the student's awareness of the benefits of incorporation of technology into Science and Math studies.	3a. Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data (meets in 2a, 3a, and 4b).
		4. To increase the student's ability to interpret and understand his/her world mathematically.	4a. Explain and predict quantitative, analytical and graphical situations 4b. Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data (meets in 2a, 3a, and 4b).

To promote an atmosphere of academic and intellectual freedom and respect for diverse expression in an environment of physical safety that is supportive of teaching and learning.	The School educates its majors to think independently and have the knowledge, skills and vision to work in all types of situations and careers and communicate with all types of people.		
To provide a general liberal arts education that supports specialized academic programs and prepares students for lifelong learning and service in a diverse society.	The School offers general education courses of high quality and purpose that provide a foundation for life-long learning.	5. To prepare a student to matriculate into a four-year degree program in math or science-related fields or graduate.	5a. Demonstrate a thorough knowledge and understanding of basic physical science principles and their applications (meets in 1a and 5a).
To provide students with a diverse, innovative faculty dedicated to excellence in teaching, scholarly pursuits and continuous improvement of programs.	The School fosters a community of scholars among the faculty and students of the institution.		
To provide university-wide student services, activities and resources that complement academic programs.			
To support and strengthen student, faculty and administrative structures that promote shared governance of the institution.			
To promote and encourage student, faculty, staff and community interaction in a positive academic climate that creates opportunities for cultural, intellectual and personal enrichment for the University and the communities it serves.	The School will offer and promote artistic, scientific, cultural, and public affairs events on the campus and in the region.	6. To serve as a resource for the community, utilizing the expertise of the faculty.	

PART 2

Revisit Proposed Changes Made in Previous Assessment Cycle

Revisit each instructional/assessment change proposed in Part 5 of the degree program SLR for the preceding year. Indicate whether the proposed change was implemented and comment accordingly. Any changes the department implemented for this academic year, but which were not specifically proposed in the preceding report, should also be reported and discussed here. Please note if no changes were either proposed or implemented for this academic year.

Proposed Change	Implemented? (Y/N)	Comments
Department was planning to incorporate Graduating Student Survey results about overall department experience for this assessment cycle. No changes were implemented for this academic year	N	It was debatable to include these survey results as an SLO and as a result it is under revision. So temporarily removed that SLO from the report.

PART 3

Response to University Assessment Committee Peer Review

The University Assessment Committee provides written feedback on departmental assessment plans through a regular peer review process. This faculty-led oversight is integral to RSU's commitment to the continuous improvement of student learning and institutional effectiveness. UAC recommendations are not compulsory and departments may implement them at their discretion. Nevertheless, respond below to each UAC recommendations from last year's peer review report. Indicate whether the recommendation was implemented and comment accordingly. Please indicate either if the UAC had no recommendations or if the program was not subject to review in the previous cycle.

Peer Review Feedback	Implemented (Y/N)	Comment
"Assessment Measure 1a: In Part F, replace "moving average" with "average," since a moving average is a statistical concept	Y	Was corrected to average instead moving average

that is not being applied in the presentation of the results. In Part H, remove the reference to a moving average, as only a simple average of the results for the last seven years was presented"		
"Assessment Measure 1b: For consistency with the phrasing of the performance standard for Assessment Measure 1a (and with examples provided in the SLR template appendix), rephrase the performance standard as "At least 70% of majors will earn a grade of 70% or better on four hourly exams in Math 1613, Trigonometry.""	Y	Rephrased for consistency
"SLO 5: No report provided. This SLO is apparently the same as SLO 1a. However, the presentation for SLO 1a doesn't mention SLO 5. At the point in SLR Section 4, Evaluation of Student Learning, where the reader would expect to see a report for SLO 5, a note should be provided, referring the reader to SLO 1a."	N	Do not see a need to implement
"SLO 4 Assessment Measure 4a: The assessment measure "Composite lab grade in CHEM 1415…." doesn't appear to correspond with the SLO statement "Explain and predict analytical and graphical situations." This may relate to the misalignment in SLOs referenced in note 2 above."	N	Do not see a need to implement
"SLO 5: No report provided. This SLO is apparently the same as SLO 1a. However, the presentation for SLO 1a doesn't mention SLO 5. At the point in SLR Section 4, Evaluation of Student Learning, where the reader would expect to see a report for SLO 5, a note should be provided, referring the reader to SLO 1a."	N	Do not see a need to implement
"Since student satisfaction is not itself a learning outcome, SLO 6 should be revised. No report provided. The report table should be provided with a note that the assessment measure has not yet been implemented."	Y	Under revision. A note provided

PART 4
Evidence of Student Learning

Evidence and analyze student progress for each of the student learning outcomes (same as listed in Part I B above) for the degree program. See the *Appendix* for a detailed description of each component. Note: The table below is for the first program learning outcome. Copy the table and insert it below for each additional outcome. SLO numbers should be updated accordingly.

A. Student Learning Outcome					
SLO #1: Demonstrate a thorough knowledge and understanding of basic physical science principles and their applications.					
B. Assessment Measure	**C. Performance Standard**	**D. Sampling Method**	**E. Sample Size (n)**	**F. Results**	**G. Standard Met (Y/N)**
1A. **Direct Measure:** American Chemical Society (ACS) academic assessment exam.	1A. At least 50% of majors who take the American Chemical Society (ACS) standardized exam will score in the 36th percentile or higher.	1A. All Physical Science Major Students taking CHEM 1415, General Chemistry II.	1A. 2 (2017-18) 3 (2016-17) 5 (2015-16) 2 (2014-15) 1 (2013-14) 3 (2012-13) 3 (2011-12) 5 (2010-11) 2 (2009-10) 26 Total	1A. 50% (1/2) of majors met the assessment performance standard in 2017-18; 67% (2/3) of majors met the assessment performance standard in 2016-17; 60% (3/5) of majors met the assessment performance standard in 2015-16; 50% (1/2) of majors met the assessment performance standard in 2014-15; 100% (1/1) of majors met the assessment performance standard in 2013-14; 0% (0/3) of majors met the assessment performance standard in 2012-13; 66.7% (2/3) of majors met the assessment performance standard in 2011-12; 60% (3/5) of majors met the assessment performance standard in 2010-11; 100% (2/2) of majors met the assessment	1A. Y (2017-18) Y (2016-17) Y (2015-16) Y (2014-15) Y (2013-14) N (2012-13) Y (2011-12) Y (2010-11) Y (2009-10) Y: Nine-year average

				performance standard in 2009-10. A 9-year "average" showed that 15/26 (58%, N = 26) majors met the assessment performance standard.	
1B. **Direct Measure**: Four hourly exams in MATH 1613, Trigonometry.	1B. At least 70% of majors will earn a grade of 70% or better on the four hourly exams in Math 1613, Trigonometry.	1B. All Physical Science Major Students taking Math 1613.	1B. 7 (2017-18) On-ground (OG)-7 Blended (B)-N/A 6 (2016-17) On-ground (OG)-2 Blended (B)-4 - (2015-16) 6 (2014-15) 3 (2013-14) 6 (2012-13) 12 (2011-12) 40 Total	1B. 1 of 7 (14%) [OG-1/7 and B-N/A] scored 70% or better on the hourly exams in 2017-18; 5 of 6 (83%) [OG-2/2 and B-3/4] scored 70% or better on the hourly exams in 2016-17; No data were available during 2015-16; 4 of 6 (67%) scored 70% or better on the hourly exams in 2014-15; 3 of 3 (100%) in 2013-14; 6 of 6 (100%) in 2012-13; 10 of 12 (83%) in 2011-12.	1B. N (2017-18) Y (2016-17) - (2015-16) N (2014-15) Y (2013-14) Y (2012-13) Y (2011-12)
1C. **Direct Measure**: Four lecture exams in PHYS 2015, Engineering Physics I (if offered) and PHYS 1114, General Physics I. Note: Both are first semester introductory level physics courses with the same focus. PHYS 2015 is calculus based, intended for students majoring in physics, mathematics or engineering.	1C. At least 50% of the Majors will score 70% or greater on four lecture exams in PHYS 2015 and/or PHYS 1114.	1C. All Physical Science Major Students taking PHYS 2015 and/or PHYS 1114.	1C. 5 (2017-18) 3 (2016-17) 2 (2015-16) 2 (2014-15) 9 (2013–14) 15 (2012-13) 4 (2011-12) 40 Total	1C. 60% (3/5) MPS majors scored 70% or better on four lecture exams in 2017-2018; 67% (2/3) in 2016-17; 50% (1/2) in 2015-16; 100% (2/2) in 2014-15; 22% (2/9) in 2013-14; 47% (7/15) in 2012-13; 75% (3/4) in 2011-12.	1C. Y (2017-18) Y (2016-17) Y (2015-16) Y (2014-15) N (2013-14) N (2012-13) Y (2011-12)

1D. **Direct Measure:** Written paper of a field study of interpretation of geological processes and geological formations in GEOL 1224, Historical Geology.	1D. 70% of all majors will score 70% or greater on the final field analysis paper.	1D. All Physical Science Major Students taking GEOL 1224.	1D. 5 (2017-18) - (2016-17) 5 (2015-16) 6 (2014-15)	1D. 100% (5/5) of geology majors scored 70% or greater on their term paper in 2017-18 academic year. No data were available for 2016-17 as the course was not offered. 100% of majors scored 70% or greater on their paper in 2015-16 and in 2014-15 academic years.	1D. Y (2017-18) - (2016-17) Y (2015-16) Y (2014-15)

H. Conclusions

1A. A majority of majors in CHEM 1415 possess basic knowledge of chemistry, and have an understanding of its principles and their applications. With small N (number of majoring students in CHEM 1415), annual fluctuations are to be expected. Keeping an average of the data reveals any on-going trends.

1B. This year's results were not to the expected standard. However, results were above or very close to the performance target in five of the last six years where data were available, suggesting students (majors) understand the basic trigonometric concepts to the standards expected by the department.

1C. A majority of MPS majors were able to demonstrate a thorough knowledge and understanding of basic principles related to mechanics, heat, and sound, and their applications. (The standards were met continuously for four years, and five times in past seven academic years).

1D. All geology majors in GEOL 1224 Historical Geology, scored 70% or greater on their comprehensive term project. In fact, the geology majors in this course this year scored 85% or greater on this assessment which consisted of the development of a Geological Time Scale of the History of the Earth in regards to evolution of major biotic groups on Earth, major extinction events, the evolution of surface climates and topography and the examination of major extinction events and their causes. The project required students to determine major climate changes, tectonic plate locations, sea level rises/falls, and atmospheric evolution through time. These events/biota were placed within a time scale that was accurately divided into the standard geologic Periods and Epochs.

A. **Student Learning Outcome**					
SLO #2: Apply problem solving skills through critical thinking and the scientific methods.					
B. Assessment Measure	**C. Performance Standard**	**D. Sampling Method**	**E. Sample Size (n)**	**F. Results**	**G. Standard Met (Y/N)**
2A. **Direct Measure**: Titration lab reports and Beers Law lab reports in CHEM 1415, General Chemistry II.	2A. At least 50% of majors will earn a grade of 70% or higher for lab reports.	2A. All Physical Science Major Students taking CHEM 1415, General Chemistry II.	2A. 2 (2017-18) 3 (2016-17) 5 (2015-16) 2 (2014-15) 1 (2013-14) 3 (2012-13) 3 (2011-12) 5 (2010-11) 2 (2009-10) 26 Total	2A. 100% (2/2) of majors met the assessment performance standard in 2017-18; 100% (3/3) of majors met the assessment performance standard in 2016-17; 80% (4/5) of majors met the assessment performance standard in 2015-16; 100% (2/2) of majors met the assessment performance standard in 2014-15; 0% (0/1) of majors met the assessment performance standard in 2013-14; 100% (3/3) of majors met the assessment performance standard in 2012-13; 100% (3/3) of majors met the assessment performance standard in 2011-12; 40% (2/5) of majors met the assessment performance standard in 2010-11; 100% (2/2) of majors met the assessment performance standard in 2009-10. A 9-year "average" showed that 21/26 (81%, N = 26) majors met the assessment performance standard.	2A. Y (2017-18) Y (2016-17) Y (2015-16) Y (2014-15) N (2013-14) Y (2012-13) Y (2011-12) N (2010-11) Y (2010-09) Y: Nine-year average
2B. **Direct Measure:** Three assignments in MyMathLab in MATH 1613, Trigonometry. These topics were trigonometric functions, inverse	2B. At least 70% of majors will earn a grade of 70% or better on the three assignments in MATH 1613.	2B. All Physical Science Major Students taking MATH 1613, Trigonometry.	2B. 7 (2017-18) On-Ground (OG)-7 Blended (B)- N/A 6 (2016-17) On-Ground (OG)-2 Blended (B)-4	2B. In 2017-18, 5 of 7 (71%) [OG-5/7 and B-N/A] of the majors scored 70% or better on the homework assignment "trigonometric functions"; 2 of 3 (67%) [OG-2/3 and B-N/A, only one section out of three have given assignments from this topic] of the majors scored 70% or better	2B. Y/N (2017-18) Y (2016-17) - (2015-16) Y (2014-15) Y (2013-14) Y (2012-13)

trigonometric functions, and complex numbers.			- (2015-16) 6 (2014-15) 3 (2013-14) 6 (2012-13) 12 (2011-12)	on the homework assignment “inverse trigonometric functions”; 4 of 7 (57%) [OG-4/7, and B-N/A] of the majors scored 70% or better on the homework assignment “complex numbers”. Please note no data were available for 2015-16.	Y (2011-12)
2C. **Direct Measure**: Four lecture exams in PHYS 2015, Engineering Physics I (if offered) and PHYS 1114, General Physics I. Note: Both are first semester introductory level physics courses with the same focus. PHYS 2015 is calculus based, intended for students majoring in physics, mathematics or engineering.	2C. At least 50% of the Majors will score 70% or greater on four lecture exams.	2C. All Physical Science Major Students taking PHYS 2015 and PHYS 1114.	2C. 5 (2017-18) 3 (2016-17) 2 (2015-16) 2 (2014-15) 9 (2013–14) 15 (2012-13) 4 (2011-12) 40 Total	2C. 60% (3/5) MPS majors scored 70% or better on four lecture exams in 2017-2018; 67% (2/3) in 2016-17; 50% (1/2) in 2015-16; 100% (2/2) in 2014-15; 22% (2/9) in 2013-14; 47% (7/15) in 2012-13; 75% (3/4) in 2011-12.	2C. Y (2017-18) Y (2016-17) Y (2015-16) Y (2014-15) N (2013-14) N (2012-13) Y (2011-12)
2D. **Direct Measure**: Term project in GEOL 1224, Historical Geology: a geologic model of the Earth through time. Includes: evolutionary and extinction events, tectonic plate locations, atmospheric conditions, sea level	2D. 70% of majors will score 70% or greater on their comprehensive geologic model term project.	2D. All Physical Science Major Students taking GEOL 1224, Historical Geology.	2D. 5 (2017 –18) - (2016-17) 6 (2015-16) 5 (2014-15)	2D. All geology majors enrolled in GEOL 1224 scored 70% or higher on their term project in 2017-18. In fact, 4/5 geology majors scored 85% or higher. No data were available for 2016-17 as the course was not offered. 100% geology majors scored 70% or higher on their term project in 2015-16 and in 2014-15 academic years.	2D. Y (2017-18) - (2016-17) Y (2015-16) Y (2014-15)

changes, major orogenic locations, events, climatic changes, etc.					

H. Conclusions
2A. This measure was met in four of the past five years. With small N (number of majoring students in CHEM 1415), annual fluctuations are to be expected. Keeping an average of the data reveals any on-going trends. 2B. Performance standards were met five out of last seven years (data were not available for one year). Majority of Math. and Physical Science (MPS) majoring students taking MATH 1613, Trigonometry, demonstrate required skills in problem solving (related to topics trigonometric functions, inverse trigonometric functions, and complex numbers) through critical thinking and by applying trigonometric concepts. 2C. A majority of MPS majors in PHYS 1114 and PHYS 2015 were able to demonstrate problem solving skills through critical thinking and by applying basic principles related to mechanics, heat, and sound (Performance standards were met four times continuously, and five times in past seven academic years). 2D. Expectations have been continuously met during the semesters this course has been taught. In the past 4 years the course has been taught 3 times and each of those times the geology majors' scores exceeded the 70% suggested average. These students demonstrated knowledge of deep geological time, the fundamentals of evolutionary processes of ocean basins, continental plates, climates, atmospheric gases and composition as well as all life on Earth. During the semester, all of the geology majors were able to develop an accurate geological time scale ***to scale*** and incorporate ***all major evolutionary changes*** (both abiotic and biotic) throughout deep geological time.

A. Student Learning Outcome					
SLO #3: Explain and predict quantitative, analytical and graphical situations.					
B. Assessment Measure	**C. Performance Standard**	**D. Sampling Method**	**E. Sample Size (n)**	**F. Results**	**G. Standard Met (Y/N)**
3A. **Direct measure**: Ten unit-laboratory reports in PHYS 1114, General Physics and PHYS 2015, Engineering Physics I (if offered). Note: Both are first semester introductory level physics courses with the same focus. PHYS 2015 is calculus based, intended for students majoring in physics, mathematics or engineering.	3A. At least 70% of majors will average 70% or better on ten unit-laboratory reports in PHYS 1114 and PHYS 2015.	3A. All Physical Science Major Students taking PHYS 1114, General Physics and PHYS 2015, Engineering Physics I.	3A. 5 (2017-18) 3 (2016-17) 2 (2015-16) 2 (2014-15) 9 (2013–14) 15 (2012-13) 4 (2011 -12) 40 Total	3A. 80% (4/5) MPS majors met the performance standard in 2017-18; 100% (3/3) in 2016-17; 100% (2/2) in 2015-16; 100% (2/2) in 2014-15; 100% (9/9) in 2013-14; 87% (13/15) in 2012-13; 100% (4/4) in 2011-12.	3A. Y (2017-18) Y (2016-17) Y (2015-16) Y (2014-15) Y (2013-14) Y (2012-13) Y (2011-12) Y: Seven-year average
H. Conclusions					
3A. A majority of MPS majors in PHYS 1114 & PHYS 2015 were able to conduct the basic experiments and analyze and interpret the data using mathematical and/or graphical tools. (The standards were met continuously for seven academic years).					

A. Student Learning Outcome					
SLO #4: Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.					
B. Assessment Measure	**C. Performance Standard**	**D. Sampling Method**	**E. Sample Size (n)**	**F. Results**	**G. Standard Met (Y/N)**
4A. **Direct Measures** Composite lab grade in CHEM 1415, General Chemistry II.	4A. At least 50% of majors will earn a lab grade of 70% or higher on laboratory reports in CHEM 1415, General Chemistry II.	4A. All Physical Science Major Students taking CHEM 1415, General Chemistry II.	4A. 2 (2017-18) 3 (2016-17) 5 (2015-16) 2 (2014-15) 1 (2013-14) 3 (2012-13) 3 (2011-12) 5 (2010-11) 2 (2009-10) 26 Total	4A. 100% (2/2) of majors met the assessment performance standard in 2017-18; 100% (3/3) of majors met the assessment performance standard in 2016-17; 80% (4/5) of majors met the assessment performance standard in 2015-16; 100% (2/2) of majors met the assessment performance standard in 2014-15; 100% (1/1) of majors met the assessment performance standard in 2013-14; 100% (3/3) of majors met the assessment performance standard in 2012-13; 100% (3/3) of majors met the assessment performance standard in 2011-12; 60% (3/5) of majors met the assessment performance standard in 2010-11; 100% (2/2) of majors met the assessment performance standard in 2009-10. A 9-year "average" showed that 23/26 (88%, N = 26) majors met the assessment performance standard.	4A. Y (2017-18) Y (2016-17) Y (2015-16) Y (2014-15) Y (2013-14) Y (2012-13) Y (2011-12) Y (2010-11) Y (2010-09) Y: Nine-year average
4B. **Direct measure**: Ten unit-laboratory reports in PHYS 1114, General Physics and PHYS 2015, Engineering Physics I (if offered). Note:	4B. At least 70% of majors will average 70% or better on ten unit-laboratory reports in PHYS 1114 and PHYS 2015.	4B. All Physical Science Major Students taking PHYS 1114, General Physics and PHYS 2015, Engineering Physics I.	4B. 5 (2017-18) 3 (2016-17) 2 (2015-16) 2 (2014-15) 9 (2013–14) 15 (2012-13)	4B. 80% (4/5) MPS majors met the performance standard in 2017-18; 100% (3/3) in 2016-17; 100% (2/2) in 2015-16; 100% (2/2) in 2014-15; 100% (9/9) in 2013-14; 87% (13/15) in 2012-13; 100% (4/4) in 2011-12.	4B. Y (2017-18) Y (2016-17) Y (2015-16) Y (2014-15) Y (2013-14) Y (2012-13)

Both are first semester introductory level physics courses with the same focus. PHYS 2015 is calculus based, intended for students majoring in physics, mathematics or engineering.			4 (2011 -12) 40 Total		Y (2011-12) Y: Seven-year average.

H. Conclusions
4A. Standards were met for the last nine academic years continuously. A majority of majors in CHEM 1415 were able to design and conduct experiments, and successfully analyze and interpret the data gathered from them. With small N (number of MPS majoring students in CHEM 1415), annual fluctuations are to be expected. Keeping a moving average of the data reveals any on-going trends.
4B. A majority of majors in PHYS 1114 & PHYS 2015 were able to conduct the experiments and analyze and interpret the data using mathematical and/or graphical tools. (The standards were met consistently for seven academic years).

PART 5
Proposed Instructional or Assessment Changes

Learning outcomes assessment can generate actionable evidence of student performance that can be used to improve student success and institutional effectiveness. Knowledge of student strengths and weakness gained through assessment can inform faculty efforts to improve course instruction and program curriculum. Below discuss potential changes the department is considering which are aimed at improving student learning or the assessment process. Indicate which student learning outcome(s) will be affected and provide a rationale for each proposed change. These proposals will be revisited in next assessment cycle.

Proposed Change	Applicable Learning Outcomes	Rationale and Impact
Department's plan to incorporate Graduating Student Survey results about overall department experience for the next assessment cycle is under revision.	Graduating students will indicate (rate) their satisfaction about overall department experience.	Department purpose 6 has no student learning outcome aligned with it, and addition of this new student learning outcome will help to assess and improve department services.

PART 6

Summary of Assessment Measures

A. How many different assessment measures were used?
Nine different assessment measures were used.

B. List the direct measures (see appendix):
Nine direct measures:
[1] Gen. Chemistry II: The American Chemical Society (ACS) Academic Assessment Exam (1A); [2] Trigonometry: Exams (1B); [3] Physics: Exams (1C, 2C); [4] Geology: Written Paper (1D); [5] Gen. Chemistry II: Lab Reports (2A); [6] Trigonometry: Class Assignments (2B); [7] Geology: Term Project (2D); [8] Physics: Laboratory Reports (3A, 4B); [9] Gen. Chemistry II: Laboratory Reports-Grades (4A)

C. List the indirect measures (see appendix):
No indirect measures were used.

PART 7
Faculty Participation and Signatures

A. Provide the names and signatures of all full time and adjunct faculty who contributed to this report.

Faculty Name	Assessment Role	Signature
Dr. Jamie Graham	Prepared the report, reviewed, and approved final draft.	Jamie M Graham
Dr. Doug Grenier	Reviewed and approved final draft.	[signature]
Dr. Min Soe	Collected and analyzed Physics and Trigonometry data; reviewed and approved final draft.	[signature]
Dr. Kirk Voska	Collected and analyzed Chemistry data; reviewed and approved final draft.	Kirk Voska
Dr. Kasia Roberts	Collected Chemistry data; reviewed and approved final draft.	[signature]
Dr. Ram Adhikari	Collected and analyzed Trigonometry data; reviewed and approved final draft.	[signature]
Dr. Suhkitha Vidurupola	Prepared the report, reviewed, and approved final draft.	Suhkitha Vidurupola

B. Reviewed by:

Titles	Name	Signature	Date
Department Head	Dr. Jamie Graham	Jamie M Graham	5/23/18
Dean	Dr. Keith Martin	[signature]	5/24/18

Appendix

Student Learning Outcome

Student learning outcomes are the observable or measurable results that are expected of a student following a learning experience. Learning outcomes may address knowledge, skills, attitudes, or values that provide evidence that learning has occurred. They can apply to a specific course, a program of study, or an institution. Outcomes should be worded in language that clearly implies a measurable behavior or quality of student work. Outcomes should also include Bloom's action verbs appropriate to the skill level of learning expected of students.

Examples:

Students will be able to apply principles of evidence-based medicine to determine clinical diagnoses and implement acceptable treatment modalities.

Students will be able to articulate cultural and socioeconomic differences and the significance of these differences for instructional planning.

Assessment Measure

An assessment measure is a tool or instrument used to gather evidence of student progress toward an established learning outcome. Every program learning outcome should have at least one appropriate assessment measure. Learning outcomes are frequently complex, however, and may require multiple measures to accurately assess student performance. Assessment plans should try to incorporate a combination of direct and indirect assessment measures. Direct provide concrete evidence of whether a student has command of a specific subject or content area, can perform a certain task, exhibits a particular skill, demonstrates a certain quality in their work, or holds a particular value. Because direct measures tap into actual student learning, it is often viewed as the preferred measure type. Indirect measures assess opinions or thoughts about the extent of a student's knowledge, skills, or attitudes. They reveal characteristics associated with learning, but they only imply that learning has occurred. Both types of measures can provide useful insight into student learning and experiences in a program. Each also has unique advantages and disadvantages in terms of the type of data and information it can provide. Examples of common direct and indirect measures are listed below.

Direct Measures

- Comprehensive exams
- Class assignments
- Juried review of performances and exhibitions
- Internship or clinical evaluations
- Portfolio evaluation
- Pre/post exams
- Third-party exams such as field tests, certification exams, or licensure exams
- Senior thesis or capstone projects

Indirect Measures

- Graduate exit interviews
- Focus group responses
- Job placement statistics
- Graduate school placement statistics
- Graduation and retention rates
- Student and alumni surveys that assess perceptions of the program
- Employer surveys that assess perceptions of graduates
- Honors and awards earned by students and alumni.

Performance Standard
A performance standard is a clearly-defined benchmark that establishes the minimally-acceptable level of performance expected of students for a particular measure.

Examples:
At least 70% of students will score 70% or higher on a comprehensive final exam.
At least 75% of students will earn score a "Proficient" or higher rating on the Communicate Effectively rubric.

Sampling Method
Sampling method describes the methodology used for selecting the students that were assessed for a given measure. In some cases, such as most course-embedded measures, it is possible to assess all active enrolled students. In other cases, however, it is not feasible to measure the population of all potential students. In these cases, it is important that a well-designed sampling scheme be used to ensure the sample of students measured is an unbiased representation of the overall population. Where multiple instructors teach a particular course, care should be taken to assess students across all instructors, including adjuncts.

Examples:
All students enrolled in BIOL 4801 Biology Research Methods II
All majors graduating in the 2016-17 academic year.

Sample Size
Sample size is the number of students from which evidence of student learning was obtained for a given assessment measure.

Results
Results are an analytical summary of the findings arising from the assessment of student performance for a particular assessment measure. Typical presentation includes descriptive statistics (mean, median, range) and score frequency distributions.

Standard Met?
This is a simple yes/no response that indicates whether the observed level of student performance for a particular measure meets or exceeds the established standard. An N/A may be used where circumstances prevented the department from accurately assessing a measure.

Conclusion
The conclusion is a reflective summary and determination of the assessment results obtained for a specific learning outcome. Questions to consider in this section include the following:

- Does the assessment evidence indicate the learning outcome is being satisfactorily met?
- Where multiple measures are used for a single outcome, do the results present a consistent or contradictory pattern?
- What are the most valuable insights gained from the assessment results?
- What strengths and weaknesses in student learning do the results indicate?
- What implications are there for enhancing teaching and learning?
- How can the assessment process be improved?