DEGREE PROGRAM STUDENT LEARNING REPORT

(Rev. August 2013)

ROGERS STATE UNIVERSITY

Department of Math and Physical Science
For Academic Year 2012-2013

Effectively assessing a degree program should address a number of factors:

1) Valid student learning outcomes should be clearly articulated;
2) Valid assessment measures should be used, consistent with the standards of professional practice;
3) There should be evidence that assessment data are being used by faculty to make necessary instructional or assessment changes; and there should be evidence that instructional or assessment changes are being implemented to improve student learning.

Relationship of Degree Program (or Major) Learning Outcomes to Departmental and University Missions

Name of Degree, including Level and Major: AS in Physical Science

1) A. Insert and clearly state the school, department and degree program missions in the spaces below.

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. Three departments comprise this School, the Departments of Biology, Health Science, and Math and Physical Science. These departments pledge to deliver existing and newly developed programs that meet student demands, and to be responsive to the evolving culture of academia in general and the sciences in particular. Our Strategy is to foster an	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.

University Mission	School Mission	Department Mission	Degree Program Mission
	academic setting of diverse curricula that inherently incorporates an environment of service and collegiality.		

B. Insert and clearly state school purposes, department purposes and degree program student learning outcomes in the spaces below, making sure to align the degree program student learning outcomes with their appropriate school and department purposes, and these outcomes and purposes 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 **Curriculum** utilizes academically rigorous methodologies delivered by a quality faculty who possess a broad base of content knowledge and promote the acquisition, application and discussion of current subject matter. The School uses effective instructional techniques, empirical and evidenced-based inquiry, innovative technology, and a variety of learning environments for the purpose of enhancing student learning*	To increase the student's critical thinking and reasoning abilities.	Demonstrate problem solving skills through critical thinking and the scientific method in mathematics and science courses.
		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.	Demonstrate problem solving skills through critical thinking and the scientific method.
		To increase the student's awareness of the benefits of incorporation of technology into Science and Math studies.	Explain and predict quantitative, analytical and graphical situations.
		To increase the student's ability to interpret and understand his/her world mathematically.	Apply problem solving skills through critical thinking and the scientific method.
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 promotes a challenging, positive, and inquisitive ***Collegial*** environment of high ethical standards and of frequent interactions between faculty and students to foster		

University Commitments	School Purposes	Department Purposes	Student Learning Outcomes
	independent thought and the collegial exchange of ideas.		
To provide a general liberal arts education that supports specialized academic program sand prepares students for lifelong learning and service in a diverse society.	The School recognizes the importance of scientific literacy in general education and its contribution to the liberal studies curriculum of the university.	To prepare a student to matriculate into a four-year degree program in math or science-related fields.	Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
To provide students with a diverse, innovative faculty dedicated to excellence in teaching, scholarly pursuits and continuous improvement of programs.			
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.	Our commitment to ***Service*** enhances the public welfare and economic development potential of our region by cultivating strategic partnerships with health and science-related industries, secondary and higher education institutions, and through active participation and leadership in civic and professional organizations by our faculty and students. These collaborative efforts are based on the belief that through shared relationships, service reinforces and strengthens learning, and learning reinforces and strengthens service. An emphasis of service	To serve as a resource for the community, utilizing the expertise of the faculty.	

University Commitments	School Purposes	Department Purposes	Student Learning Outcomes
	encourages social awareness and responsibility among faculty and students.		

Discussion of Instructional Changes Resulting from 2011-12 Degree Program Student Learning Report

2) List and discuss all instructional or assessment changes proposed in Part 5 of last year's Degree Program Student Learning Report, whether implemented or not. Any other changes or assessment activities from last year, but not mentioned in last year's report, should be discussed here as well. Emphasis should be placed on student learning and considerations such as course improvements, the assessment process, and the budget. If no changes were planned or implemented, simply state "No changes were planned or implemented."

Instructional or Assessment Changes	Changes Implemented (Y/N)	Impact of Changes on Degree Program Curriculum or Budget
No changes made by Chemistry.		
Assessment measure was revised to read "Student scores in two sections related to various applications of integration: geometrical (measures of geometric shapes) and physical problems (masses and work) in MATH 2364".	Y	There is no impact on the degree program curriculum or budget was expected. It conditioned reemphasizing some topics in delivering the material to students and focusing their attention.
The Performance Standard for MATH 1613 (Trigonometry) was revised to read "At least 50% of students **(on the majors list)** will earn a grade of 70% or better on the four hourly exams in MATH 1613."	Y	There was no impact on the degree program curriculum or budget. 6 of 6 (100%) of the students (on the majors list) taking a trigonometry class (scored 70% or better on the "four" exams). With this change of the trigonometry assessment (going from the last two exams to all four exams), the results were more representative of total student achievement.
This year we selected three topics (from the course description to evaluate); the homework assignments on trigonometric functions, inverse trigonometric functions, and complex numbers.	Y	6 of 6 (100%) of the students (on the majors list) taking a trigonometry class (scored 70% or better on the homework assignment "trigonometric functions"). 5 of 6 (83.3%) of the students (on the majors list) taking a trigonometry class (scored 70% or better on the homework assignment "inverse trigonometric functions"). 5 of 6 (83.3%) of the students (on the majors list) taking a trigonometry class (scored 70% or better on the homework

		assignment "complex numbers"). With this trigonometry assessment (evaluating three topics), the results were representative of total student achievement.

3) The University Assessment Committee in its Degree Program Peer Review Report provided feedback and recommendations for improvement in assessment. List or accurately summarize all feedback and recommendations from the committee, and state whether they were implemented or will be implemented at a future date. If they were not or will not be implemented, please explain why. If no changes were recommended last year, simply state "No changes were recommended."

Feedback and Recommended Changes from the University Assessment Committee	Suggestions Implemented (Y/N)	Changes that Were or Will Be Implemented, or Rationale for Changes that Were Not Implemented
Regarding degree outcome 1 namely "Demonstrate a thorough knowledge and understanding of basic science principles and their applications." Consider labeling the following assessment measures: "Student Scores from CHEM 1415 on the ACS..." as 1a), 1b), 1c), etc.	Y	Included in this SLR for clarity.
The performance standard for the first assessment measure (ACS exam) states that students will score "in the 36th percentile or higher". Why 36th? Is this standard suggested by ACS?	Explanation Provided	The 36th percentile was chosen because roughly 10% of the material on the ACS exam is not taught in the course. So an approximation was made that student scores will be lowered by about that same amount. So instead of the typical student scoring in the 50th percentile the typical student would score in the 36th percentile. It is understood that there are reliability issues when making this assumption but it the opinion of the chemistry faculty that the ACS exam is a robust exam which still possesses good reliability under these circumstances.
The Department Purposes on p. 2 lists four goal/ objectives, yet the Degree Program Outcomes on p. 2 includes only one. The second Department Purposes (p. 3) lists one goal/objective, yet the Degree Program Outcomes includes three goals or objectives. (p. 3) Some of the Degree Program Outcomes on p. 3 would seem to be more appropriately aligned with the Department Purposes on p. 2.	Y	The following student outcomes were incorporated into the Department Purposes as suggested by the Assessment Committee.

With some measures it is clear that only majors were included; with other measures it was not clear.	N	It is implicit in the assessment process that only majors are included in the data.
Whereas the conclusions addressed the strengths reflected by students having met the measures' standards, there was scant if any discussion of weaknesses, which is a requirement included in the rubric.	N	
Why are lab scores and chapter exams listed as indirect measures? Is it because they lack rubrics scoring guides, or is it because various measures are included in the grade?	Y	Lab scores in 4a are composite lab scores (indirect measures) while lab scores in while lab scores in 20 are from two specific labs (direct measures). Language has been added for clarification.

Analysis of Evidence of Student Learning Outcomes

4) For all student learning outcomes (as listed in Part 1 B above), describe the assessment measures and performance standards used, as well as the sampling methods and sample sizes. For each measure, document the results of the activity measured and draw any relevant conclusions related to strengths and weaknesses of their performance.

A. Student Learning Outcomes	B. Assessment Measures	C. Performance Standards	D. Sampling Methods	E. Sample Size (N)	F. Results	G. Conclusions	H. Performance Standards Met (Y/N)
1. Demonstrate a thorough knowledge and understanding of basic physical science principles and their applications.	1a) Student scores from CHEM 1415: General Chemistry II on the American Chemical Society (ACS) academic assessment exam.	1a) At least 50% of students who take the American Chemical Society (ACS) standardized exam will score in the 36th percentile or higher.	1a) Student scores from CHEM 1415: General Chemistry II on the American Chemical Society (ACS) academic assessment exam.	1a) 3 (12-13) 3 (11-12) 5 (10-11) 2 (09-10) 10 Total	1a) 0% (0/3) of students met the assessment performance standard in 2012-13; 66.7% (2/3) of students met the assessment performance standard in 2011-12; 60% (3/5) of students met the assessment performance standard in 2010-11; 100% (2/2) of students met the assessment performance	1a) A majority of students in CHEM 1415 possess basic knowledge of chemistry, and have an understanding of its principles and their applications. With small N annual fluctuations are to be expected. Keeping a moving average of the data reveals any on-going trends.	1a) N (2012-13) Y (2011-12) Y (2010-11) Y (2010-09) Y: four year av.

A. Student Learning Outcomes	B. Assessment Measures	C. Performance Standards	D. Sampling Methods	E. Sample Size (N)	F. Results	G. Conclusions	H. Performance Standards Met (Y/N)
					standard in 2009-10. A 4-year "moving average" showed that 7/13 (54%, N = 13) students met the assessment performance standard.		
	1b) **Indirect Measures**: Student (on the majors list) scores on hourly exams in MATH 1613 Trigonometry.	1b) At least 50% of students earned a grade of 70% or better on the four hourly exams in MATH 1613.Trigonometry	1b) Student scores from MATH 1613.	1b) 6 (12–13) 12(11-12) 7 (10-11) ---------- 25 Total	1b) 6 of 6 students (majors) taking MATH 1613 Trigonometry (12-13) scored 70% or better on the "four" exams.	1b) With a change of the trigonometry assessment (going from the last two exams to all four exam), the results were more representative of total student achievement.	Y
	Direct Measures: This year in MATH 1613, three topics (from the course description) were evaluated. These topics included trigonometric functions, inverse trigonometric functions, and complex numbers.	The Performance Standard for MATH 1613 (Trigonometry) read "At least 50% of students (on the majors list) will earn a grade of 70% or better on three selected homework assignments in MATH 1613."	Student scores from three topics in trigonometry.	6 (12-13)	6 of 6 (100%) of the students (on the majors list) taking a trigonometry class (scored 70% or better on the homework assignment "trigonometric functions"). 5 of 6 (83.3%) of the students (on the majors list) taking a trigonometry class (scored 70% or better on the homework assignment "inverse trigonometric functions"). 5 of 6 (83.3%) of the students (on the majors list) taking a trigonometry class (scored 70% or better on the homework	The use of direct measurements allowed for better understanding of student learning trends within the scope of the course.	

A. Student Learning Outcomes	B. Assessment Measures	C. Performance Standards	D. Sampling Methods	E. Sample Size (N)	F. Results	G. Conclusions	H. Performance Standards Met (Y/N)
					assignment "complex numbers").		
	1c) Student scores in MATH 2364 on four sections related to various application of integration; geometrical (measures of geometric shapes) and physical problems (masses and work).	1c) At least 50% of students (on the majors list) will earn a grade of 70% or better on assignments and exam scores related to two sections pertaining to applications of integration; geometrical (measures or geometric shapes) and physical problems (masses and work).	1c) Students scores from MATH 2364.	1c) 14 (12-13)	1c) 64% (9/14) of students met the assessment performance standard in 2012-2013 and 60% (3/5) in 2011-12. For two years the performance is 63.2% (12/19). The difference between average scores of >70% an <70% is 86.56-13.38 = 32 which may be attributed to individual attitudes of students (in 2011-2012 this equaled 32).	1c) Students possess knowledge and understanding of basic principles and applications of calculus. This is necessary for their successl in Engineering Physics I and further courses.	1c) Y (11-12) Y(12-13) Y: (Two year Average)
	1d) Student scores on PHYS 2015 Engineering Physics I lecture exams and unit laboratory reports.	1d) Students must score 70% or greater on three lecture exams and on unit laboratory reports.	1d) Student scores from Engineering Physics I lecture and laboratory.	1d) 9	1d) 8/9 (89%) students completed the course with a 70% or higher grade. 8/9 (89%) scored a 70% or higher on unit laboratory reports. 4/9 (44%) scored 70% or higher on 3 hourly lecture exams.	1d) Program majors were able to apply general physics principles to solving complex physics problems.	1d) Y (2011 – 12) N (2010 – 11) Y (2010 - 09 Y: three year aveage
2. Apply problem solving skills	Student scores on Titration lab	At least 50% of CHEM 1415 students who	Student scores on these labs	3 (12-13) 3 (11-12) 5 (10-11)	100% (3/3) of students met the assessment performance standard in	This measure was met in two of the past three years. With small N	Y (2012-13) Y (2011-12) N (2010-11)

A. Student Learning Outcomes	B. Assessment Measures	C. Performance Standards	D. Sampling Methods	E. Sample Size (N)	F. Results	G. Conclusions	H. Performance Standards Met (Y/N)
through critical thinking and the scientific method.	and Beers Law lab in CHEM 1415: General Chemistry II.	successfully complete CHEM 1415: General Chemistry II will earn a grade of 70% or higher.	for CHEM 1415.	2 (09-10) 10 Total	2012-13; 100% (3/3) of students met the assessment performance standard in 2011-12; 40% (2/5) of students met the assessment performance standard in 2010-11; 100% (2/2) of students met the assessment performance standard in 2009-10;. A 4-year "moving average" showed that 10/13 (77%, N = 13) students met the assessment performance standard.	annual fluctuations are to be expected. Keeping a moving average of the data reveals any on-going trends.	Y (2010-09) Y: four year avg
3. Explain and predict quantitative, analytical and graphical situations.	3a) Direct measure: Unit laboratory reports in PHYS 1114: General Physics and 2015 Engineering Physics I.	3a) At least 50% of students will average 70% or better on unit laboratory reports in PHYS 1114: General Physics I and PHYS 2015 Engineering Physics I.	3a) Unit laboratory reports in PHYS 1114: General Physics I and PHYS 2015 Engineering Physics I.	3a) 15(12 -13) 4 (11-12) 4 (10-11) 10 (09-10) 33 Total	3a) 13/15 (87%) of MPS majors met the assessment performance standard. [scored a semester total of 70% or higher on unit laboratory reports in PHYS1114 and PHYS 2015.	3a) A majority of students in PHYS1114 & PHYS2015 were able to show their ability to design and conduct experiments, as well as to analyze and interpret the data using mathematical/graphical tools.	3a) Y(2012-13) Y (2011-12) N (2010-11) Y (2010-09) Y: four year avg
	3b) Student scores in two sections related to various applications of integration:	3b) At least 50% of students will earn a grade of 70% or better on assignments and exams scores related to two	3b) Student scores from MATH 2364: Calculus II.	3b) 5 (11-12) 6 (10-11) 4 (09-10) 15 Total	3b) 60% (3/5) of students met the assessment performance standard in 2011-2012 and 66.7% (4/6) in 2010-11. For two years is 63.6% (7/11). The difference between		3b) Y (09-10) Y (10-11) Y (11-12) Y: Three year Ave

A. Student Learning Outcomes	B. Assessment Measures	C. Performance Standards	D. Sampling Methods	E. Sample Size (N)	F. Results	G. Conclusions	H. Performance Standards Met (Y/N)
	geometrical (measures of geometric shapes) and physical problems (masses and work).	sections pertaining to applications of integration: geometrical (measures of geometric shapes) and physical problems (masses and work).			average scores of >70% and <70% is 81-49 = 32 which may be thought of as a reduction in variance (was 63 in 2010-11).		
4. Design and conduct experiments, as well as to analyze and interpret data.	4a) Student lab grade scores in CHEM 1415 General Chemistry II.	4a) At least 50% of students who successfully complete CHEM 1415: General Chemistry II will earn a lab grade of 70% or higher.	4a) Student scores on the labs for CHEM 1415 General Chemistry II.	4a) 3 (11-12) 5 (10-11) 2 (09-10) 10 Total	4a) 100% (3/3) of students met the assessment performance standard in 2011-12; 60% (3/5) of students met the assessment performance standard in 2010-11; 100% (2/2) of students met the assessment performance standard in 2009-10;. A 3-year "moving average" showed that 8/10 (80%, N = 10) students met the assessment performance standard.	4a) A majority of students in CHEM 1415 were able to design and conduct experiments, and successfully analyze and interpret the data gathered from them. With small N annual fluctuations are to be expected. Keeping a moving average of the data reveals any on-going trends.	4a) Y (2011-12) Y (2010-11) Y (2010-09) Y: three year avg
	4b) Direct measure: Unit laboratory reports in PHYS 1114:	4b) At least 50% of students will average 70% or better on Unit laboratory reports in PHYS 1114:	4b) Unit laboratory reports in PHYS 1114: General Physics I	4b) 15(12 -13) 4 (11-12) 4 (10-11) 10 (09-10) 33 Total	4b) 13/15 (87%) of MPS majors met the assessment performance standard. [scored a semester total of 70% or higher on unit laboratory	4b) A majority of students in PHYS1114 and PHYS2015 were able to show their ability to design and conduct experiments, as well as	4b) Y(2012-13) Y (2011-12) N (2010-11) Y (2010-09) Y: four year

A. Student Learning Outcomes	B. Assessment Measures	C. Performance Standards	D. Sampling Methods	E. Sample Size (N)	F. Results	G. Conclusions	H. Performance Standards Met (Y/N)
	General Physics I and 2015 Engineering Physics I.	General Physics I and PHYS 2015 Engineering Physics I.	and PHYS 2015 Engineering Physics I.		reports in PHYS1114 and PHYS 2015]	to analyze and interpret the data using mathematical/graphical tools.	avg

5) State any proposed instructional or assessment changes to be implemented for the next academic year. They should be based on conclusions reported in Part 4 (above) or on informal activities, such as faculty meetings and discussions, conferences, pilot projects, textbook adoption, new course proposals, curriculum modifications, etc. Explain the rationale for these changes and how they will impact student learning and other considerations, such as curriculum, degree plan, assessment process, or budget. If no changes are planned, simply state "No changes are planned."

Student Learning Outcomes	Instructional or Assessment Changes	Rationale for Changes	Impact of Planned Changes on Student Learning and Other Considerations.
No changes are planned.			

6) (OPTIONAL) If your department or an individual faculty member has developed a teaching technique they believe improves student learning or student engagement in the classroom, please share it below. Examples can be seen at http://www.rsu.edu/committees/assessment/docs/FacultyInsights.pdf . Please briefly describe the instructional practice. More detail can be communicated during the face to face peer review session. The Peer Review Report does not rate this part, but it does note whether or not any contribution has been made.

Description

7) Assessment Measures:

A. How many different assessment measures were used? 14

B. List the direct measures (see rubric):

Trigonometry (MATH 1613):This year in MATH 1613, three topics (from the course description) were evaluated. These topics included:

1. Trigonometric functions,
2. Inverse trigonometric functions, and
3. Complex numbers.

General Chemistry II (CHEM 1415): Student scores on:

1. Tritration Lab and
2. Beer's Law Lab.

Calculus (MATH 2364):

1. Student scores on homework with particularly selected assignments.
2. Student scores on and student research projects.

General Physics I (PHYS 1114): Lecture exams and unit laboratory reports.

Engineering Physics (PHYS 2015): Lecture exams and unit laboratory reports.

C. List the indirect measures (see rubric):

Tigonomety (MATH 1613): Students' successful completion of the course with 70% or better in overall final grade.

General Chemistry II (CHEM1415): Student scores on the ACS exam. Composite student laboratory grades.

Calculus (MATH 2364): Students final grades for the course.

General Physics I (PHYS 1114): None

Engineering Physics (PHYS 2015): None

Documentation of Faculty Assessment

8) A. How many full time faculty (regardless of department affiliation) teach in the program? seven

B. Provide the names and signatures of all faculty members who contributed to this report and indicate their respective roles:

Faculty Members	Roles in the Assessment Process (e.g., collect data, analyze data, prepare report, review report, etc.)	Signatures
Dr. Doug Grenier, Professor of Mathematics	Collected and analyzed math assessment data for MATH 1613.	
Dr. Jalalidin Jaenbai, Assistant Professor of Mathematics	Collected and analyzed math assessment data for MATH 2364.	
Mr. Sam Richardson, Assistant Professor of Mathematics	Collected and analyzed math assessment data for MATH 1613.	
Dr. Min Soe, Professor of Physics	Collected and analyzed engineering physics data for PHYS 2015.	
Dr. Kirk Voska, Professor of Chemistry	Collected and analyzed math assessment data for CHEM 1415.	

9) Reviewed by:

Titles	Names	Signatures	Date
Department Head	Dr. Jamie M. Graham		10/16/13
Dean	Dr. Keith Martin		12/23/2013