



Lander University: Unit/Program Review Report

UNIT/PROGRAM NAME	Environmental Science
OFFICE OF PRIMARY RESPONSIBILITY	Department of Physical Sciences
ASSESSMENT COORDINATOR	Ralph Layland
SUBMISSION DATE OF THIS REPORT	May 15, 2009

- I. **UNIT/PROGRAM GOAL:** Understand the scientific basis (chemistry, biology, geology, basic environmental sciences) for environmental challenges and proposed solutions

Strategic Goal Supported	1. Learning						
Indicator of Success/ Student Learning Outcome AND Summary of Data	Indicator/ Learning Outcome		AY 2007-2008	AY 2008-2009			
	1.	Demonstrate an understanding of the scientific basis (chemistry, biology, geology, basic environmental sciences) for environmental challenges and proposed solutions	2.75 (n = 4)	2.5 (n=5)			
	2.	Demonstrate an understanding of the scientific basis (chemistry, biology, geology, basic environmental sciences) for environmental challenges and proposed solutions	2.1 (n = 1)	2.26 (n=2)			
	3.	Demonstrate an understanding of the scientific basis of chemistry for environmental challenges and proposed solutions.	41.7% (n = 1)	30.6% (n=3)			
	4.	Demonstrate an understanding of the scientific basis of biology for environmental challenges and proposed solutions	78.6% (n = 1)	38.1% (n=3)			
	5.	Demonstrate an understanding of the scientific	45.5%	30.3%			

		basis of geology for environmental challenges and proposed solutions.	(n = 1)	(n=3)			
	6.	Demonstrate an understanding of the scientific basis of basic environmental sciences for environmental challenges and proposed solutions	92.3% (n = 1)	56.4% (n=3)			
Assessment Instrument(s) and Frequency of Assessment	Instrument		Frequency				
	1.	Presentation Rubric	Annually - used to evaluate student term paper or semester project from ES-301, 302, 310, 407, 490, or GEOL-405.				
	2.	Poster Rubric	Annually - Poster Rubric used to evaluate student posters in ES-407, or 490.				
	3.	A locally designed environmental science exit exam	Annually - administered to students in ES-499				
	4.	A locally designed environmental science exit exam	Annually - administered to students in ES-499				
	5.	A locally designed environmental science exit exam	Annually - administered to students in ES-499				
	6.	A locally designed environmental science exit exam	Annually - administered to students in ES-499				
Expected Outcome	Met (3)		Partially Met (2)		Not Met (1)		
	1.	The mean of all student scores will be at or above 2.0 indicating meets requirements or better performance on the sub-part of the rubric addressing this Indicator of success.	The mean of all student scores will be above 1.7 and less than 2.0 indicating partially meets requirements on the sub-part of the rubric addressing this Indicator of success.				
	2.	The mean of all student scores will be at or above 2.0 indicating ACCEPTABLE or better performance on the sub-part of the rubric addressing this Indicator of success.	The mean of all student scores will be at or above 1.7 and less than 2.0 indicating partially meets requirements on the sub-part of the rubric addressing this Indicator of success.				
	3.	The average score of all student scores on a locally designed exit exam will be greater than 50% on specific questions related to chemistry.	The average score of all student scores on a locally designed exit exam will be greater than 35% and less than 50% on specific questions related to chemistry.				

	4.	The average score of all student scores on a locally designed exit exam will be greater than 50% on specific questions related to biology.	The average score of all student scores on a locally designed exit exam will be greater than 35% and less than 50% on specific questions related to biology.	
	5.	The average score of all student scores on a locally designed exit exam will be greater than 50% on specific questions related to geology.	The average score of all student scores on a locally designed exit exam will be greater than 35% and less than 50% on specific questions related to geology.	
	6.	The average score of all student scores on a locally designed exit exam will be greater than 50% on specific questions related to basic environmental sciences.	The average score of all student scores on a locally designed exit exam will be greater than 35% and less than 50% on specific questions related to basic environmental sciences	
Review of Results and Actions Taken	1.	<p>2009: Goal was met for this assessment instrument.</p> <p>2008: Met Goal. ES-301, ES-302 are taught every other year and so data for those courses will not be available until 2008-2009 academic year.</p> <p>This item will be addressed in the future by rewriting the rubric for more precision in specifying the requirements for student understanding and using it as a springboard for class discussions on the expectations for this aspect of the term paper or project.</p> <p>Portfolio rubric under development for 2008-2009 year.</p>		
	2.	<p>2009: The goal was met for this assessment instrument.</p> <p>2008: ES 490, Poster Rubric, sections 4. UNDERSTANDING OF MODERN SCIENTIFIC CONCEPTS AND ISSUES, 5. ANALYSIS AND INTERPRETATION OF (CHEMICAL) DATA and 6. DEPTH OF KNOWLEDGE cover this goal. The mean score across all faculty rating the poster for these items was 2.1 (n=1, evaluators=10).</p> <p>This goal was met for this assessment instrument.</p> <p>Although based on a single student, the goal was met. No program changes regarding this means of assessment are anticipated at this time.</p>		

	3.	<p>2009: The goal was not met for this assessment instrument. The results were based on a small sample size of N=3. One of the students was evaluated for much chemistry material taken at another institution, so that data would not represent learning in this program.</p> <p>Several questions on the locally designed exit exam refer to topics covered in courses that are no longer part of the core requirements, but which are considered major electives. The exit exam will be modified to reflect that observation by replacing some of those questions with questions representing material from program core chemistry courses.</p> <p>2008: This is considered a statistically insignificant result and a score >40% could be treated as nearly meeting the goal.</p> <p>Because the results were based on a single student and were still above 40%, no program changes are anticipated at this time.</p>
	4.	<p>2009: The goal was partially met for this assessment instrument. The results were based on a small sample size of N=3. One of the students was evaluated for much biology material taken at another institution, so that data would not represent learning in this program.</p> <p>Several questions on the locally designed exit exam refer to topics covered in courses that are no longer part of the core requirements, but which are considered major electives. The exit exam will be modified to reflect that observation by replacing some of those questions with questions representing material from program core biology courses.</p> <p>2008: This is considered a statistically insignificant result due to the fact that it is based on a single student. The goal was met.</p> <p>Although based on a single student, the goal was apparently met. No program changes regarding this means of assessment are anticipated at this time.</p>
	5.	<p>2009: The goal was not met for this assessment instrument. The results were based on a small sample size of N=3. One of the students was evaluated for much geology material taken at another institution, so that data would not represent learning in this program. Furthermore, several questions on the exam were taken from a course that was cancelled due to low enrollment during the senior year of two students, so that two students would not have had the material covered on the test.</p> <p>No change is anticipated in this case. based on geology related material as reflected in the exit exam. A senior</p>

		<p>level core course was cancelled due to low enrollment and one of the students had taken essentially all geology at another institution, so it is believed that the data are not representative of the material covered in the program.</p> <p>2008: This is considered a statistically insignificant result and a score >40% could be treated as nearly meeting the goal.</p> <p>Because the results were based on a single student and were still above 40%, no program changes are anticipated at this time.</p>	
	6.	<p>2009: The objective was met for this assessment instrument. It should be noted that this section represented material which was covered at this institution for all three students.</p> <p>No changes are currently anticipated regarding this material.</p> <p>2008: This is considered a statistically insignificant result due to the fact that it is based on a single student. The goal was met.</p> <p>Although based on a single student, the goal was apparently met. No program changes regarding this means of assessment are anticipated at this time.</p>	
	Sum		
Outcomes		Indicator of Success Evaluation	Indicator of Success Score
	1.	Met	3
	2.	Met	3
	3.	Not Met	1
	4.	Partially Met	2
	5.	Not Met	1
	6.	Met	3
Additional Resources Required to Achieve or Sustain Results	<p>\$0.00</p> <p>Explanation</p>		

- II. **UNIT/PROGRAM GOAL:** Students will be able to use the scientific method and associated critical thinking skills to formulate questions, design experiments and interpret and evaluate data to answer them.

Strategic Goal Supported	1. Learning					
Indicator of Success/ Student Learning Outcome AND Summary of Data	Indicator/ Learning Outcome		AY 2007- 2008	AY 2008- 2009		
	1.	Students will use the scientific method and associated critical thinking skills to formulate questions, design experiments and interpret and evaluate data to answer them.	2.1 (n = 1)	2.42 (n=2)		
	2.	Students will use the scientific method and associated critical thinking skills to formulate questions, design experiments and interpret and evaluate data to answer them.	92.3% (n = 1)	36.4% (n=3)		
	3.					
	4.					
	5.					
	6.					
Assessment Instrument(s) and Frequency of Assessment	Instrument		Frequency			
	1.	Poster Rubric	Annually - used to evaluate student term paper or semester project from ES-301, 302, 407, 490, or GEOL-405.			
	2.	A locally designed environmental science exit exam	Annually - administered to students in ES-499.			
	3.					
	4.					
	5.					
	6.					
Expected Outcome	Met (3)		Partially Met (2)		Not Met (1)	
	1.	The mean of all student scores will be	The mean of all student scores will be			

		at or above 2.0 indicating ACCEPTABLE or better performance on the sub-part of the rubric addressing this Indicator of success.	above 1.7 and less than 2.0 indicating partially meets requirements on the sub-part of the rubric addressing this Indicator of success.	
	2.	The average score of all student scores on a locally designed exit exam will be greater than 50% on specific questions related to this Indicator of Success.	The average score of all student scores on a locally designed exit exam will be greater than 35% and less than 50% on specific questions related to this Indicator of Success	
	3.			
	4.			
	5.			
	6.			
	Review of Results and Actions Taken	1.	<p>2009: The goal was met for this assessment instrument. One of the students did not accompany the poster presentation so that evaluation in this case was taken from those who attended a classroom presentation with this student.</p> <p>No change is planned at this time, with respect to this goal and assessment instrument.</p> <p>2008: Portfolio rubric under development for 2008-2009 year.</p> <p>This goal was met for this assessment instrument.</p> <p>Although based on a single student, the goal was met. No program changes regarding this means of assessment are anticipated at this time.</p>	
2.		<p>2009: The goal was partially met for this goal and assessment instrument. Careful analysis of the test results showed that several of the questions related to a core course that was cancelled in the students' senior year due to low enrollment. Several other questions related to hydrogeology, which one student took at another institution. For these reasons, the data cannot be considered representative of the program with respect to this goal.</p> <p>The test will be reviewed and questions added or changed to provide more useful data for assessment of this goal.</p>		

		<p>Related to this goal, in-course instruction for two of the core courses (ES 310 and GEOL 405) that are heavily represented in evaluation of this goal have experienced and will experience an increase in the use of in-class problem solving. It should be noted that neither course is a lab science course, though both courses would benefit from having associated labs or recitations. Due to resource limitations (faculty), there are no current plans to expand these courses into lab science courses.</p> <p>2008: This is considered a statistically insignificant result due to the fact that it is based on a single student. The goal was met.</p> <p>Although based on a single student, the goal was apparently met. No program changes regarding this means of assessment are anticipated at this time.</p>	
	3.		
	4.		
	5.		
	6.		
	Sum		
Outcomes		Indicator of Success Evaluation	Indicator of Success Score
	1.	Met	3
	2.	Partially Met	2
	3.	Choose One	0
	4.	Choose One	0
	5.	Choose One	0
	6.	Choose One	0
Additional Resources Required to Achieve or Sustain	<p>\$60,000</p> <p>To fully meet this goal, lab sessions would be added to each of the core courses, ES 310 (Environmental Geology) and GEOL 405 (Hydrogeology). In addition, students would benefit greatly from a lab in geographic</p>		

Results	information systems (GIS), a standard tool in the discipline. Currently, GIS is incorporated sporadically in ES 302 lecture material, which does not provide the students sufficient opportunity to become proficient or confident in their skills. GIS skills are among the most sought after skills among employers. The addition of such hands-on activities as these will do much to increase recruitment of students into the program, as well as to increase the competitive value of their degrees. This modification of the program would require one new faculty appointment in the discipline. The figure indicated above includes salary, benefits and miscellaneous costs associated with a new faculty hire plus a nominal amount to upgrade our GIS software and hardware.
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III. **UNIT/PROGRAM GOAL:** Students will have developed writing and presentation skills appropriate for students and practitioners in the discipline of environmental science.

Strategic Goal Supported	1. Learning						
Indicator of Success/ Student Learning Outcome AND Summary of Data	Indicator/ Learning Outcome		AY 2007- 2008	AY 2008- 2009			
	1.	Students will have developed writing and presentation skills appropriate for students and practitioners in the discipline of environmental science.	2.0 (n = 4)	2.6 (n=5)			
	2.	Students will have developed writing and presentation skills appropriate for students and practitioners in the discipline of environmental science.	2.4 (n = 1)	2.4 (n=2)			
	3.	Students will have developed writing and presentation skills appropriate for students and practitioners in the discipline of environmental science.	2.0 (n = 1)	2.3 (n=2)			
	4.	Students will have developed writing and presentation skills appropriate for students and practitioners in the discipline of environmental science.	2.4 (n = 1)	2.5 (n=3)			
	5.						
	6.						
Assessment	Instrument		Frequency				

Instrument(s) and Frequency of Assessment	1.	Presentation Rubric	Annually - to evaluate student term paper or semester project from ES-301, 302, 310, 407, 490, or GEOL-405.		
	2.	Poster Rubric	Annually - used to evaluate student posters in ES 407, or 490.		
	3.	Presentation Rubric	Annually - used to evaluate student presentations in ES-499		
	4.	Mock Interview Rubric	Annually - used to evaluate student presentations in ES-499		
	5.				
	6.				
Expected Outcome	Met (3)		Partially Met (2)		Not Met (1)
	1.	The mean of all student scores will be at or above 2.0 indicating ACCEPTABLE or better performance on the sub-part of the rubric addressing this Indicator of success.	The mean of all student scores will be above 1.7 and less than 2.0 indicating partially meets requirements on the sub-part of the rubric addressing this Indicator of success.		
	2.	The mean of all student scores will be at or above 2.0 indicating ACCEPTABLE or better performance on the sub-part of the rubric addressing this Indicator of success.	The mean of all student scores will be above 1.7 and less than 2.0 indicating partially meets requirements on the sub-part of the rubric addressing this Indicator of success.		
	3.	The mean of all student scores will be at or above 2.0 indicating ACCEPTABLE or better performance on the sub-part of the rubric addressing this Indicator of success.	The mean of all student scores will be above 1.7 and less than 2.0 indicating partially meets requirements on the sub-part of the rubric addressing this Indicator of success.		
	4.	The mean of all student scores will be at or above 2.0 indicating ACCEPTABLE or better performance on the sub-part of the rubric addressing this Indicator of success.	The mean of all student scores will be above 1.7 and less than 2.0 indicating partially meets requirements on the sub-part of the rubric addressing this Indicator of success.		
	5.				

	6.		
Review of Results and Actions Taken	1.	2009: The goal was met based on this assessment instrument. No program changes are anticipated in response to this at this time.	
	2.	2009: The goal was met based on this assessment instrument. No program changes are anticipated in response to this at this time. 2008: This goal was met for this assessment instrument. Although based on a single student, the goal was apparently met. No program changes regarding this means of assessment are anticipated at this time.	
	3.	2009: The goal was met based on this assessment instrument. No program changes are anticipated in response to this at this time. 2008: This goal was met for this assessment instrument. Although based on a single student, the goal was apparently met. No program changes regarding this means of assessment are anticipated at this time.	
	4.	2009: The goal was met based on this assessment instrument. No program changes are anticipated in response to this at this time. 2008: This goal was met for this assessment instrument. Although based on a single student, the goal was apparently met. No program changes regarding this means of assessment are anticipated at this time.	
	5.		
	6.		
	Sum		
	Outcomes		Indicator of Success Evaluation
1.		Met	3
2.		Met	3

	3.	Met	3
	4.	Met	3
	5.	Choose One	0
	6.	Choose One	0
Additional Resources Required to Achieve or Sustain Results	\$0.00 Explanation		

IV. **UNIT/PROGRAM GOAL:** Based on an understanding of the legal, ethical, social, political, and economic ramifications of environmental problems, policy, and decisions, students will be able to develop and articulate well informed and reasoned views on environmental issues.

Strategic Goal Supported	1. Learning					
Indicator of Success/ Student Learning Outcome AND Summary of Data	Indicator/ Learning Outcome		AY 2007- 2008	AY 2008- 2009		
	1.	Based on an understanding of the legal, ethical, social, political, and economic ramifications of environmental problems, policy, and decisions, students will be able to develop and articulate well informed and reasoned views on environmental issues.	2.1 (n = 1)	2.7 (n=3)		
	2.					
	3.					
	4.					
	5.					
	6.					
Assessment Instrument(s) and	Instrument		Frequency			
	1.	Mock Interview Rubric	Annually - used to evaluate student presentations in ES 499.			

Frequency of Assessment	2.			
	3.			
	4.			
	5.			
	6.			
Expected Outcome		Met (3)	Partially Met (2)	Not Met (1)
	1.	The mean of all student scores will be at or above 2.0 indicating ACCEPTABLE or better performance on the sub-part of the rubric addressing this Indicator of success.	The mean of all student scores will be above 1.7 and less than 2.0 indicating partially meets requirements on the sub-part of the rubric addressing this Indicator of success.	
	2.			
	3.			
	4.			
	5.			
	6.			
Review of Results and Actions Taken	1.	<p>2009: This goal was met for this assessment instrument. No change in the program is anticipated regarding this goal at present.</p> <p>2008: This goal was met for this assessment instrument.</p> <p>Although based on a single student, the goal was apparently met. No program changes regarding this means of assessment are anticipated at this time.</p>		
	2.			
	3.			
	4.			
	5.			

	6.		
	Sum		
Outcomes		Indicator of Success Evaluation	Indicator of Success Score
	1.	Met	3
	2.	Choose One	0
	3.	Choose One	0
	4.	Choose One	0
	5.	Choose One	0
	6.	Choose One	0
Additional Resources Required to Achieve or Sustain Results	\$0.00	Explanation	

V. UNIT/PROGRAM SUMMARY

Unit/Program Goal	Strategic Goal Supported	Unit/Program Goal Outcome		Additional Resources Required to Achieve or Sustain Results
		Score	Evaluation Met: 3.00 – 2.01 Partially Met: 2.00 – 1.01 Not Met: 1.00 – 0.01 Not Evaluated: 0.00	
1. Understand the scientific basis (chemistry, biology, geology, basic environmental sciences) for environmental challenges and proposed solutions	1. Learning	2.00	Partially Met	\$0.00
2. Students will be able to use the scientific method and associated critical thinking skills to formulate questions, design experiments and	1. Learning	2.00	Partially Met	\$60000

interpret and evaluate data to answer them.				
3. Students will have developed writing and presentation skills appropriate for students and practitioners in the discipline of environmental science.	1. Learning	3.00	Met	\$0.00
4. Based on an understanding of the legal, ethical, social, political, and economic ramifications of environmental problems, policy, and decisions, students will be able to develop and articulate well informed and reasoned views on environmental issues.	1. Learning	3.00	Met	\$0.00
5.	Choose One	0.00	Choose One	\$0.00
6.	Choose One	0.00	Choose One	\$0.00
7.	Choose One	0.00	Choose One	\$0.00
8.	Choose One	0.00	Choose One	\$0.00
9.	Choose One	0.00	Choose One	\$0.00
10.	Choose One	0.00	Choose One	\$0.00
UNIT/PROGRAM TOTALS		2.50	Met	\$0.00