Core Competencies Assessment 2008-2009: Area III Courses

New Mexico Institution Name | **Laboratory Science Competencies**

State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures** **Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
1. Students will describe the process of scientific inquiry. Students should: a. Understand that scientists rely on evidence obtained from observations rather than authority, tradition, doctrine, or intuition. b. Students should value science as a way to develop reliable knowledge about the world.	ASTR 110G "Introduction to Astronomy" Evaluation was conducted upon student responses provided in response to a question embedded on the Spring 2010 Final Exam; 51 responses were evaluated	Only 10% of students provided responses deemed EXEMPLARY; an additional ~65% of students provided responses deemed 'ACCEPTABLE' or 'MARGINAL'; 25% of respondents provided responses deemed 'BEGINNING' (unacceptable)	The concepts and components of the Scientific Method will be more frequently discussed during a semester, with specific in-class astronomical discussion topics being more frequently reconnected to the methods of scientific inquiry	A goal is to have > 66% of students unambiguously demonstrating ACCEPTABLE or EXEMPLARY understanding by the end of the 2010-2011 Academic Year
2. Students will solve problems scientifically. Students should: a. Be able to construct and test hypotheses using modern lab equipment (such as microscopes, scales, computer technology) and appropriate quantitative methods. b. Be able to evaluate isolated observations about the physical universe and relate them to hierarchically organized explanatory frameworks (theories).				
3. Students will communicate scientific information. Students should:				

(Continued)

Core Competencies Assessment 2008-2009: Area III Courses

New Mexico Institution Name — **Laboratory Science Competencies, cont.**

State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures** **Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
Communicate effectively about science (e.g., write lab reports in standard format and explain basic scientific concepts, procedures, and results using written, oral, and graphic presentation techniques.)				
4. Students will apply quantitative analysis to scientific problems. Students should: a. Select and perform appropriate quantitative analyses of scientific observations. b. Show familiarity with the metric system, use a calculator to perform appropriate mathematical operations, and present results in tables and graphs.				
5. Students will apply scientific thinking to real world problems. Students should: a. Critically evaluate scientific reports or accounts presented in the popular media. b. Understand the basic scientific facts related to important contemporary issues (e.g., global warming, stem cell research, cosmology), and ask informed questions about those issues. End – Laboratory Science				

Area III Assessment completed by J R Murphy *Signature* — James R. Murphy *Printed Name* — 9/10/09 *Date*

NMSU Common Core Assessment
BIOLOGY Department (Area III)

Core Competencies Assessment 2007-2008 & 2008-2009: Biology New Mexico State University Laboratory Science Competencies Biology 101G, Biology 211G				
State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures** **Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
1. Students will describe the process of scientific inquiry. Students should: a. Understand that scientists rely on evidence obtained from observations rather than authority, tradition, doctrine, or intuition. b. Students should value science as a way to develop reliable knowledge about the world.	To be assessed 2009-2010			

Michele Shuster
9/21/09

Core Competencies Assessment 2007-2008 & 2008-2009: Biology

New Mexico State University **Laboratory Science Competencies**

Biology 101G, Biology 211G

State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
2. Students will solve problems scientifically. Students should: a. Be able to construct and test hypotheses using modern lab equipment (such as microscopes, scales, computer technology) and appropriate quantitative methods. b. Be able to evaluate isolated observations about the physical universe and relate them to hierarchically organized explanatory frameworks (theories).	To be assessed 2010-2011			

Core Competencies Assessment 2007-2008 & 2008-2009: Biology

New Mexico State University **Laboratory Science Competencies**

Biology 101G, Biology 211G

State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures** **Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
3. Students will communicate scientific information. Students should: Communicate effectively about science (e.g., write lab reports in standard format and explain basic scientific concepts, procedures, and results using written, oral, and graphic presentation techniques.	To be assessed 2011-2012.			
4. Students will apply quantitative analysis to scientific problems. Students should: a. Select and perform appropriate quantitative analyses of scientific observations. b. Show familiarity with the metric system, use a calculator to perform appropriate mathematical operations, and present results in tables and graphs.	Was Assessed on 2007-2008			

Core Competencies Assessment 2007-2008 & 2008-2009: Biology

New Mexico State University **Laboratory Science Competencies**

Biology 101G, Biology 211G

State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures** **Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
5. Students will apply scientific thinking to real world problems. Students should: a. Critically evaluate scientific reports or accounts presented in the popular media. b. Understand the basic scientific facts related to important contemporary issues (e.g., global warming, stem cell research, cosmology), and ask informed questions about those issues. End – Laboratory Science	Assessed in 2008-2009. We used on-going embedded projects in the laboratory courses for Biol 101G (Human Biology) and Biol 211G (Cellular and Organismal Biology). Students had to carry out and present a research project on a current issue (recycling in Biol 101G and diabetes in Biol 211G). We assessed individual statements of implications (carried out early in the semester) and final projects (group work) in each course. See attached rubrics.	Students in both Biol 101G and Biol 211G submitted individual statements of implications that were, on average, determined to be "Acceptable". The Biol 101G final recycling projects were also found to be, on average, "Acceptable". In Biol 211G, the final diabetes projects were found to be, on average, "Marginal", and the decline in scores between the early individual assignments and the final projects was statistically significant.	The Common Core Assessment Committee has several ideas about the Biol 211G final projects, as well as several anticipated outcomes that would demonstrate improvement. These include multiple drafts of the final project and more oversight by Teaching Assistants, leading to (among other outcomes) (i) a better understanding of experimental design, as evidenced by the design and interpretation of observational and correlative experiments (ii) a more critical interpretation of results, and (iii) conclusions that are more directly linked both to the data and to the original problem and hypothesis We have also noted that additional cross-talk between lecture and lab could help students with some of the more challenging concepts.	The Biology Common Core Assessment Committee strongly feels that the option to adopt a two-year assessment cycle for each competency will result in much more meaningful student learning. We recommend allowing Departments the flexibility to spend two (or even three) years on a particular competency, if the results from the first year suggest that improvements are particularly warranted. For example, we would prefer to spend another year working on the "real world problem" competency before moving on to "describing the process of scientific inquiry". Feedback is most useful when it is formative and delivered in a way that allows prompt action and evaluation of that action.

NMSU Biology Common Core Assessment
2007-2008 Scoring Rubrics (Quantitative Analysis)

Biol 111G

1. Workshop activity (in-class, group work)
   - HW Equilibrium
   - 1 pt for showing their work (PROPERLY)
   - 0.5 pts for numerically correct answers for each tables (total of 2 pts)
   - 1 pt for interpretation
     - 0.5 for the first part
     - 0.5 for the second part
     - (note, if an explanation is provided, but is incorrect, factor that into your scoring)

2. Pop Quiz (individual work)
   - 0.5 pt for question 1
   - 1 pt for question 2
   - 2 pt for question 3

3. Exam questions
   - four multiple-choice exam questions, 1 pt each. Tally total correct.

Biol 211G.

1. Workshop assignment (Questions 6, 7, 8 and graph)

Consider the following
   - Accurate identification of independent and dependent variables
   - Summarize graph in the figure legend
   - Look for numerically correct data in the graph

2. Follow-up Homework Assignment (Questions 5, 6 and the graph)

Consider the following
   - Mean shouldn't have changed (1 pt)
   - SE should have gone down as sample size increased (1 pt)
   - Graph should be labeled appropriately, and should allow us to tell that they understood what they were graphing (1 pt)

3. Follow-up Multiple-Choice Questions
   - Tally number correct (0, 1, 2 or 3)

4. Follow-up Short Answer Exam Questions
   - Data set B will have a higher standard deviation (0 or 1 pts)
   - b/c of a greater scatter in the data (0, 1 or 2 pts)
   - (total of between 0 and 3)

NMSU Biology Common Core Assessment
2008/2009 Scoring Rubrics (Apply Scientific Thinking to Real World Problems)

1. Individual Statements of Implications

Statement of the Problem	0 or 1
Scientific Thinking -evidence of familiarity with relevant literature? -evidence of making data-driven decisions? *Note: if the answer to either of these is NO, then score a 0 in this category*	0 or 1
Making Connections -explicitly links science/experimentation to real world outcomes	0 or 1
Overall Quality -clarity	0 or 1

2. Final Projects

Hypothesis	0 or 1
Data Presentation -was data presented in coherent "summary data" (tables or graphs)?	0 or 1
Data Interpretation -did they link their data to a conclusion? -was the conclusion linked back to the original hypothesis? *Note: if the answer to either of these is NO, then score a 0 in this category*	0 or 1
Quality -methods reasonable? -references cited? -generally clear? *Note: if the answer to any of these is NO, then score a 0 in this category*	0 or 1

3. Overall Summary Scores

Total Score	*Category*
0 or 1	Beginning
2	Marginal
3	Acceptable
4	Exemplary

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New Mexico Institution Name **Laboratory Science Competencies**

State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures** **Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
1. Students will describe the process of scientific inquiry. Students should: a. Understand that scientists rely on evidence obtained from observations rather than authority, tradition, doctrine, or intuition. b. Students should value science as a way to develop reliable knowledge about the world.	N/A	N/A	N/A	N/A
2. Students will solve problems scientifically. Students should: a. Be able to construct and test hypotheses using modern lab equipment (such as microscopes, scales, computer technology) and appropriate quantitative methods. b. Be able to evaluate isolated observations about the physical universe and relate them to hierarchically organized explanatory frameworks (theories).	N/A	N/A	N/A	N/A
3. Students will communicate scientific information. Students should: (Continued)	N/A	N/A	N/A	N/A

Core Competencies Assessment 2007-2008: Area III Courses

New Mexico Institution Name — **Laboratory Science Competencies, cont.**

State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures** **Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
Communicate effectively about science (e.g., write lab reports in standard format and explain basic scientific concepts, procedures, and results using written, oral, and graphic presentation techniques.)	N/A	N/A	N/A	N/A
4. Students will apply quantitative analysis to scientific problems. Students should: a. Select and perform appropriate quantitative analyses of scientific observations. b. Show familiarity with the metric system, use a calculator to perform appropriate mathematical operations, and present results in tables and graphs.	N/A	N/A	N/A	N/A
5. Students will apply scientific thinking to real world problems. Students should: a. Critically evaluate scientific reports or accounts presented in the popular media. b. Understand the basic scientific facts related to important contemporary issues (e.g., global warming, stem cell research, cosmology), and ask informed questions about those issues. End – Laboratory Science	CHEM 110G The instructors included in their final exam thirteen questions that dealt with the assessment question for Area III, question #5 of the Common Core Competencies for the State of New Mexico. The questions are attached after this form.	The percentages obtained for each question and sections of this course by the students enrolled in this course are included in this report, whenever it was possible to obtain this data from the printouts provided by the instructor. Not all printouts were provided still a global score was obtained for all students involved in this course. The overall score was 2.96, which represents 59.10 % of the students were able to get most of the answers correct	This data will be presented to the faculty of the Department of Chemistry and Biochemistry and it will be discussed to see how we can improve on the number of students satisfying this core competency. We are close to an acceptable value, but there is still work to be done in this area.	Results will be presented at a faculty meeting of the Department of Chemistry and Biochemistry and after analysis it will be decided whether or not any changes are to be instituted based on the analysis of the presented data.

Area III Assessment completed by _____ *Signature* — **William Quintana** *Printed Name* — **7/17/09** *Date*

Phone number 646-2410

Core Competencies Assessment 2008-2009: Area III Courses

New Mexico Institution Name **Laboratory Science Competencies**

State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures** **Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
1. Students will describe the process of scientific inquiry. Students should: a. Understand that scientists rely on evidence obtained from observations rather than authority, tradition, doctrine, or intuition. b. Students should value science as a way to develop reliable knowledge about the world.	N/A	N/A	N/A	N/A
2. Students will solve problems scientifically. Students should: a. Be able to construct and test hypotheses using modern lab equipment (such as microscopes, scales, computer technology) and appropriate quantitative methods. b. Be able to evaluate isolated observations about the physical universe and relate them to hierarchically organized explanatory frameworks (theories).	N/A	N/A	N/A	N/A
3. Students will communicate scientific information. Students should: (Continued)	N/A	N/A	N/A	N/A

Core Competencies Assessment 2008-2009: Area III Courses

New Mexico Institution Name — **Laboratory Science Competencies, cont.**

State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures** **Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
Communicate effectively about science (e.g., write lab reports in standard format and explain basic scientific concepts, procedures, and results using written, oral, and graphic presentation techniques.)	N/A	N/A	N/A	N/A
4. Students will apply quantitative analysis to scientific problems. Students should: a. Select and perform appropriate quantitative analyses of scientific observations. b. Show familiarity with the metric system, use a calculator to perform appropriate mathematical operations, and present results in tables and graphs.	N/A	N/A	N/A	N/A
5. Students will apply scientific thinking to real world problems. Students should: a. Critically evaluate scientific reports or accounts presented in the popular media. b. Understand the basic scientific facts related to important contemporary issues (e.g., global warming, stem cell research, cosmology), and ask informed questions about those issues. End – Laboratory Science	CHEM 111 The instructors included in their final exam five questions that dealt with the assessment question for Area III, question #5 of the Common Core Competencies for the State of New Mexico. The questions are attached after this form.	The percentages obtained for each question and sections of this course by the students enrolled in this course are included in this report, whenever it was possible to obtain this data from the printouts provided by the instructor. Not all printouts were provided still a global score was obtained for all students involved in this course. The overall score was 2.67, which represents 53.37 % of the students were able to get most of the answers correct.	This data will be presented to the faculty of the Department of Chemistry and Biochemistry and it will be discussed to see how we can improve on the number of students satisfying this core competency. Still, the number of students mastering this area is close to acceptable so we need to work in improving passing rates..	Results will be presented at a faculty meeting of the Department of Chemistry and Biochemistry and after analysis it will be decided whether or not any changes are to be instituted based on the analysis of the presented data.

Area III Assessment completed by _____ (*Signature*) William Quintana (*Printed Name*) 7/17/09 (*Date*)

Phone number 646-2410

Core Competencies Assessment 2008-2009: Area III Courses

New Mexico Institution Name — **Laboratory Science Competencies**

Geology 111G

State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures** **Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
1. Students will describe the process of scientific inquiry.				
2. Students will solve problems scientifically.				
3. Students will communicate scientific information.				
4. Students will apply quantitative analysis to scientific problems.				

Core Competencies Assessment 2008-2009: Area III Courses

New Mexico Institution Name — **Laboratory Science Competencies, cont.**

Geology 111G

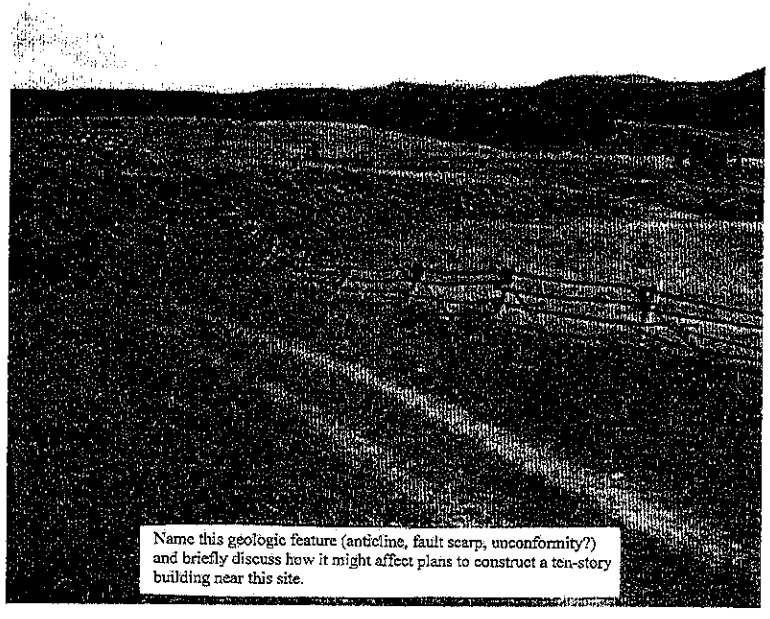
State Competencies (Learning Outcomes Being Measured)	**Assessment Procedures** **Course Name and NMCCN** (Process/Instrument named or described – rubric attached)	**Assessment Results**	**How Results Will Be Used To Make Improvements**	**(Optional)** Recommendations/Goals/ Priorities
5. Students will apply scientific thinking to real world problems. Students should: a. Critically evaluate scientific reports or accounts presented in the popular media. b. Understand the basic scientific facts related to important contemporary issues (e.g., global warming, stem cell research, cosmology), and ask informed questions about those issues. End – Laboratory Science	GEOL 111G (exam question and rubric attached) On the final lab exam for GEOL 111G, students were given a photo of a fault scarp. The area has no construction, other than a wooden fence that crosses the fault. The student is asked to: A: Name this geologic feature (anticline, fault scarp, unconformity?). B. Briefly discuss how it might affect plans to construct a ten-story building near this site. Total number of papers: 239 Number of papers in calibration: 10 Number of papers assessed: 60 (25%) Student work from the final exam for all GEOL 111G labs were photocopied by the head TA. Approximately 25% of the assignments were randomly selected. The rubric has 4 categories: 4=exemplary, 3= proficient, 2=marginal, 1=unacceptable. Written descriptions of these categories are attached. The department head and 2 TAs made the assessment. The TAs calibrated use of the rubric by assessing 10 of the preliminary assignments that were used to construct the rubric. After the 10	Exemplary/proficient: 43.3 % Marginal/unacceptable: 56.7%	We are actually at the point of improving our assessment so that we are confident that we are making appropriate changes to our course delivery. Fortunately, the most of the faculty is now involved. After discussion at a faculty meeting, we decided to integrate all five outcomes into the lab, and discussed specific questions we could use to approach each outcome. We were disappointed with the results of this evaluation; however, there was some question about the quality of the photo and the wording of the question. These arose because the person who added the question to the final exam is not involved in common core assessment. These difficulties have been addressed, and the faculty member in charge of the GEOL 111G lab is now involved in the assessment.	We were pleased with using a final exam question instead of a weekly lab; the issue of how much of the answer is from the TA was eliminated. We are working on defining appropriate material for all five outcomes, integrating appropriate material into the lectures, labs, and final exam, and Next fall, we will assess: **1. Students will describe the process of scientific inquiry.** Students should: a. Understand that scientists rely on evidence obtained from observations rather than authority, tradition, doctrine, or intuition. b. Students should value science as a way to develop reliable knowledge about the world. This process should culminate in a meeting of all the science departments to assess common core learning as a group. Because we have students at all stages of their education in GEOL 111G, the data are

	assignments were assessed, the TAs and department head discussed the calibration. Inter-reader reliability was considered acceptable if the two assessments were identical or in adjacent categories (i.e., "1" and "2", but not "1" and "3"). In the calibration, the TAs had acceptable inter-reliability for 10 of 10 assignments. As the TAs assessed student work, the department head entered the data into a spreadsheet and calculated inter-reader reliability. After 20 % of the assignments were assessed, inter-reader reliability was assessed. If there was disagreement on more than 85% of the assignments, the team would have discussed the rubric and considered assessment of these assignments as a second calibration. Assessment would have started again, and inter-reader reliability would have been assessed again, with the goal of better than 85% agreement. However, this did not happen; the assessments agreed for 98% of the documents. The percent of assignments that fall in each of the four categories in the rubric were recorded, as well as any reflections on the student work, the assignment, and the assessment process. 60 assignments were assessed; the assessments were out of range for 1 of 60 (2%). The average of the two assessments was used to assign a paper to one of two broad categories (exemplary/proficient if the score > 2.5; marginal/unacceptable if the score ≤ 2.5.).			meaningless unless interpreted in a university-wide context.

Area III Assessment completed by Nancy J McMillan *Signature* Nancy J. McMillan *Printed Name* 22 Sept 09 *Date*

Phone number 575-646-5000

Final Exam Question for Outcome 5
GEOL 111G
Geologic Hazards



Rubric for Outcome 4
GEOL 111G
Plate Tectonics

Exemplary

Student work correctly identifies the geologic feature and explicitly identifies the associated hazard (ground motion along the fault).

Proficient

Student work correctly identifies the geologic feature but only implicitly identifies the hazard.

Marginal

Student work either: 1) incorrectly identifies the geologic feature but explicitly identifies ground motion as the hazard, or 2) correctly identifies the geologic feature but fails to identify the appropriate hazard.

Unacceptable/Beginner

Student work fails to identify the geologic feature and the associated hazard.