COVER SHEET
OUTCOMES ASSESSMENT REPORT
2009-2010

Natural Sciences	Environmental Geology	Bachelors of Science
Department	**Program (major or minor)**	**(Degree)**

Jennifer Lindline	(sent via email)	12/21/2010
Assessment Coordinator (Print)	**Signature**	**Date**

Ken Bentson		
Program Chair (Print)	**Signature**	**Date**

I. NEW MEXICO HIGHLANDS UNIVERSITY MISSION

NMHU is a diverse comprehensive university serving the global community by integrating education, research, public service, and economic development, while celebrating our distinctive New Mexico cultures and traditions. We achieve this through a University-wide commitment to quality student-centered education.

II. ENVIRONMENTAL GEOLOGY PROGRAM MISSION and GOALS

Mission

> **"..The university recognizes its special obligation to undergraduate education and to the preparation of undergraduates for advanced degrees; or challenging professional careers."** (from the 2003 NMHU Strategic Plan)

The **mission** of the Environmental Geology B.S. Program is to provide students with a rigorous, high-quality education in environmental geology. The primary **goal**, in alignment with the NMHU Strategic Plan, is to develop broadly literate and technically competent students who are prepared for graduate studies or professional careers in the environmental geosciences. We aim to provide students with scientific knowledge, research aptitude, technical ability, communication skills (both written and verbal), and global competence that facilitate their transition from undergraduate students to post-graduate work or professional positions. We do this by:

- Providing a broad-based undergraduate education in the Liberal Arts and Sciences;
- Promoting geologic study and advancement of knowledge;
- Offering a superior learning experience for students through dedicated teaching, hands-on learning, engagement in research, and commitment to the individual student; and
- Securing externally funded research grants to support student opportunities.

III. 2009-2010 GEOLOGY COURSE OFFERINGS

Fall 2008

GEOL 101	Survey of Earth Science	51 students
GEOL 330	Structural Geology	7 students
GEOL 424	Environmental Geophysics	5 students
FOR 4/512	Surveying and GIS	11 students

Spring 2009

GEOL 101	Survey of Earth Science	76 students
GEOL 202	Earth History	4 students
GEOL 422	Genesis and Env Impact of Earth's Resources	4 students
GEOL 432/535	Environmental Geochemistry	7 studetns
GEOL 495	Senior Geology Applications	1 student

III. STUDENT LEARNING OUTCOMES	IV. OUTCOMES ASSESSMENT
• Classify and identify geologic materials, including soils, minerals, and rocks.	• 29/51 students in Fall 09 GEOL 101 (57%) class and 64/76 students in Spring 09 GEOL 101 (84%) class earned ≥70% on lab midterm emphasizing hand specimen description and identification. • 4/4 students in GEOL 202 earned ≥ 80% on their lab midterm as well as their lab final both of which emphasized mineral, rock, and fossil identification and interpretation.
• Read and critically evaluate relevant professional literature. • Effectively communicate scientific ideas, information, and results, both verbally and in writing, that (1) demonstrate consistent logic; (2) are well organized; (3) state and defend a thesis; and (4) demonstrate competent use of language.	• 7/7 students in GEOL 330 earned ≥ 70% on their required term paper describing an original experiment testing a structural geology principle. Of these same students, 7/7 earned ≥ 95% on their oral presentation. • 4/4 GEOL 202 students earned ≥ 80% on their term "rock project" paper and class presentation. • 1 graduating senior was enrolled in GEOL 495 and earned high marks on his final project report.
• Think critically.	• All geology courses have some critical thinking component, as students are expected to integrate field, laboratory, and map data towards a geologic interpretation. This is particularly evident in the upper-division courses. One example is the GEOL 422 Ore Genesis course that integrates mineral formation, rock associations, chemical affinities, and fluid flow to understand ore genesis and the impact of the extraction industries. All 4 students passed the course with a grade of ≥ C.
• Competently use appropriate tools from geology, chemistry, physics, and mathematics to solve discipline-specific problems.	• Environmental Geology is an interdisciplinary field. Students are expected to have an interdisciplinary content background in environmental geology and be capable of drawing on mathematical, chemical and geophysical principles to address environmental issues. One test of students' interdisciplinary skill set is the Environmental Geochemistry course that requires students to use math and chemistry principles to address geologic questions in extensive weekly problem sets. All 7 students passed the course with a grade of ≥ C. Another example is the GEOL 424 Environmental Geophysics course. It, too, requires students to integrate geologic, mathematical, and physics tools to address problems about rock magnetism and gravity. All 5 students passed the course with a grade of ≥ C. • The 1 graduating senior earned a B on his senior capstone course. He used a variety of laboratory techniques to collect and analyze mineral and rock data and prepare a professional report.
• Competently use appropriate laboratory and field methods and instrumentation.	• 5 students completed the GEOL 375 Field Course and demonstrated proficiency in using a Brunton

	compass, Jacob staff, and hand-held GPS unit for field data collection. All 5 students showed high abilities in stereographic projections, geologic mapping, cross-section construction, and report writing and earned A or B for their final grade.
• Attain employment in geology, environmental science, or related fields and/or continue graduate studies.	• The May 2010 graduate interned with a petroleum company during the Summer 2010 and Fall 2010 (Ecuador Petroleum and Natural Gas). He is now applying to graduate schools.

V. REMARKS

The Environmental Geology instructors have identified weak scientific paper writing, class absenteeism, and inattention to deadlines as on-going problems for some of the Environmental Geology majors. We are addressing this through the following measures:

1. Improving scientific paper writing. Instructors are requiring shorter but more frequent paper submissions. This will provide students with repeated opportunities in developing paper theses, gathering literature resources, synthesizing geologic information, and communicating their findings in writing. Faculty are also structuring timetables for paper milestones (topic approval, preliminary references, outline, etc.) and requiring submission of two to three drafts of the required term papers in order to keep students on a track for success.

2. Improving class attendance. Instructors are developing rigorous and uniform attendance policies.

> Attendance Policy: According to NMHU Policy, there are no un-excused absences during any academic semester. However, it is understood that during times of illness, it may be necessary to miss a class. If you are sick and must miss class, please e-mail or call your instructor immediately to communicate your situation and receive the missed material. If you have a personal situation that prevents you from attending class (such as a university-sanctioned event, religious practice, or personal emergency), you provide written verification of your situation in addition to emailing or calling your instructor for the missed work. If you miss more than three classes or labs (collectively) your course grade will drop one full letter grade. If you miss five classes/labs (collectively), you will fail the course. If you miss a test without prior arrangements, you will be given an oral make-up examination.

3. Improving student attention to deadlines. Instructors are developing rigorous and uniform deadline policies.

> Written Assignments: A number of written works will be assigned throughout the term. These assignments are due at the **beginning** of class on the date indicated. Part of professional life is meeting deadlines. **Late assignments will be penalized.** 10% of points will be deducted for assignments that are 24 hours late; 20% of points will be deducted for assignments that are 48 hours late, and 5% per day after that. You may resubmit a homework assignment for additional credit, though the maximum score attainable on resubmitted work is 85% of the assignment's original value.
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> - All material submitted for a grade must be typed (or word-processed).
> - All material submitted for a grade should show a high degree of organization, clarity of thought, solid background knowledge, and scientific literacy.
> - Grammar, spelling, and style will be evaluated and counted towards your grade for all assignments.

- Direct quotes, ideas, or thoughts of another must be cited properly. Representation of another's work as your own is plagiarism and will not be accepted.

VI. STUDENT ABSTRACTS (*denotes undergraduate student author; ** denotes graduate student author)

*Pitrucha, R. and Lindline, J., 2010, *Petrologic characteristics of granitic phases within the Hermit's Peak batholith*, New Mexico Geological Society Spring Meeting Abstracts with Program, p. 37.
Also presented at the 2010 New Mexico Highlands University Faculty-Student Research Day.

*Ashu, Richard, A and Petronis, M.S., 2010, *Geophysical Data Bearing on Hydrocarbon Traps and Resource Potential of the Galisteo Basin*, NM, New Mexico Geological Society Spring Meeting Abstracts with Program, p. 5.
Also presented at the 2010 New Mexico Highlands University Faculty-Student Research Day.

Brister, A.*, Cedillo, D.N.*, Garcia, L.A.*, Lara, H.J.*, Parson, C.B.*, Pitrucha, R.M.*, Aragon, A.*, Cattarello, R.J.*, and Petronis, M.S, 2009, *Quaternary Mapping Of Fluvial Terrace Deposits Using High Resolution Magnetic And Surveying Techniques, Huerfano County, Colorado*, Geological Society of America Annual Meeting Program with Abstracts.
Also presented at the 2010 New Mexico Highlands University Faculty-Student Research Day.

Petronis, M.S., Hacker, D.B., and Brister, A.*, 2009, *Emplacement Of The Iron Mountain Laccolith, SW Utah, Revealed By Anisotropy Of Magnetic Susceptibility And Field Mapping Studies*, Geological Society of America Annual Meeting Program with Abstracts.
Also presented at the 2010 New Mexico Highlands University Faculty-Student Research Day.

VII. STUDENT GRANT AWARDS

- **New Mexico Geological Society Grants-in-Aid of Research**
  - Richard Ashu **(Petronis–Faculty Sponsor)** *Hydrocarbon Trapping Mechanisms and Resource Potential in the Galisteo Basin, NM: Insights from Geophysical Surveying and Geologic Mapping* **($1300)** — Spring 2009
  - Hernan Lara **(Lindline–Faculty Sponsor),** *Geologic Interpretation and Sourcing of Mortar Samples at Fort Union National Monument* **($900)** — Spring 2010

- **NMHU Sigma Xi Chapter Student Research Awards**
  - Hernan Lara **(Lindline–Faculty Sponsor),** *Geologic Interpretation and Sourcing of Mortar Samples at Fort Union National Monument* **($400)** — Spring 2010
  - Richard Ashu **(Petronis–Faculty Sponsor)** *Hydrocarbon Trapping Mechanisms and Resource Potential in the Galisteo Basin, NM: Insights from Geophysical Surveying and Geologic Mapping* **($400)** — Fall 2010

- **American Association of Petroleum Geologists**
  - Richard Ashu **(Petronis–Faculty Sponsor)** *Hydrocarbon Trapping Mechanisms and Resource Potential in the Galisteo Basin, NM: Insights from Geophysical Surveying and Geologic Mapping* **($2000)** — Fall 2010