Chemistry Assessment Report for 2009

I. NMHU's Mission

New Mexico Highlands is a comprehensive state institution offering programs in liberal arts, sciences, and professional disciplines. The university is committed to excellence in teaching, discovering, preserving and applying knowledge and is responsive to new opportunities for teaching, learning, research and public service created by a changing environment.

Acknowledging its commitment to the individual student, New Mexico Highlands University provides personal attention to undergraduates and graduates. Dedicated faculty and staff readily interact with students, supporting both academic and extracurricular activities. The university brings together students from distinctive cultural, socioeconomic, linguistic, geographic, religious, and educational backgrounds. A sensitive admissions policy offers every student educational opportunities and challenging academic programs create and promote an environment in which all students are encouraged to reach their full potential. The university recognizes its special obligation to undergraduate education and to the preparation of undergraduates for advanced degrees or challenging professional careers.

New Mexico Highlands University is committed to programs that focus on its multiethnic student body, especially the rich heritage of Hispanic and Native American cultures that is distinctive of the State of New Mexico. The university clearly perceives that its success depends upon an appreciation of the region's cultural and linguistic identities. By reinforcing cultural identity and encouraging the use of these assets, the university seeks to empower students and the region's ethnic populations to achieve full involvement in the activities of society. The university recognizes the increasing importance of the Spanish language in the global community and takes advantage of its environment, location and student population to promote the development of interdisciplinary programs involving the Hispanic world. The university encourages international education, the international exchange of students and scholars, and access to global communications.

New Mexico Highlands University's larger obligation is to a society in which all groups participate on an equitable and mutually rewarding basis. The university celebrates diversity in its student and faculty community and promotes an environment in which personal respect, tolerances, and understanding are valued by all. The university aspires to develop broadly literate citizens and leaders, educated in analytical and critical thought and in the appreciation of the arts and sciences. In essence, through educational excellence and a dedication to society's needs, the university is committed to the cultivation and enrichment of the human mind and spirit.

II. Program Goals

The goal of the chemistry Bachelor of Science degree program is to adequately prepare the graduate to enter the work force at the level of a B.S. graduate. It also designed to prepare students for the rigors of a more advanced M.S. or Ph.D. program of study. Course preparation and advisement are available for students who chose to enter a profession school to study for a career in an area such as medicine, veterinary science, dentistry, pharmacy, etc.

III. Student Outcomes

Outcome #1: NMHU Bachelor of Science Chemistry graduates should have the **command of a basic body of chemical knowledge that is competitive with any B.S.** level chemistry graduate from any quality US University or institution.

Outcome #2: NMHU Bachelor of Science Chemistry graduates should be able to analyze **and solve a chemical problem** and suggest appropriate solutions to the problem that apply responsible and safe procedures. They should also have the ability and confidence to **use appropriate chemistry-related instrumentation** in the solution of the chemical problems and be able to **communicate by oral, written** and electronic modes.

Outcome #3: NMHU Bachelor of Science Chemistry graduates should have the **maturity and the work ethic** to succeed as a professional chemist or in a related technical discipline.

IV. Means of Assessment

Outcome #1: NMHU Bachelor of Science Chemistry graduates should have the command of a basic body of chemical knowledge that is competitive with any B.S.-level chemistry graduate from any quality U.S. University or institution.

Means of Assessment of Outcome #1: The American Chemical Society produces standardized entrance examinations for general, organic, analytical chemistry, biochemistry, and physical chemistry. These examinations allow the faculty to compare the competence of our students with those at other universities.

Problems with student performance and problems within the curriculum and/or the faculty can be isolated and corrected.

Criterion for Achievement of Outcome #1, First Means of Assessment: Student outcomes are considered met if students score within one standard deviation of the average of National Raw Score Composite Norms for any particular ACS subject exam.

Data: The following data have the three-year rolling average of NMHU scores compared to the national norms, where national norm plus a standard deviation is "Nntl+std" etc.

	Ntnl-std	NMHU	Ntnl+std
Gen. Chem.	16	< 32 <	81
Quant. Anal	16	< 28 <	83
Organic	18	< 25 <	81
P Ch	19	< 31 <	84
Quantum M	15	< 56 <	82
BioChem	17	< 30 <	84
Inorganic	18	< 54 <	86
Instr Anal	18	< 45 <	84
Average		38	

Analysis: In all cases the NMHU scores are within a standard deviation of the national norms. The class (physical chemistry) was just taught once is not a three-year average. The NMHU averages out to the 38th percentile. Thus the outcome criteria were met.

Outcome #2: NMHU Bachelor of Science Chemistry graduates should be able to analyze and solve a chemical problem and suggest appropriate solutions to the problem that apply responsible and safe procedures. They should also have the ability and confidence to use appropriate chemistry-related instrumentation in the solution of the chemical problems and be able to communicate by oral, written and electronic modes.

First Means of Assessment of Outcome #2: A capstone course, Chemistry 495, Senior Chemistry Applications, was implemented the first time in the spring semester, 1999. This course consists of an open-ended advanced chemistry project and a series of oral and written examinations that are designed to reveal each student's overall understanding of chemistry.

Criterion for Achievement of Outcome #2, First Means of Assessment: Student outcomes are considered met if students score a "B" or better for the capstone course.

Assessment: Outcome #2

Spring semester of 2008, our first cohorts of chemistry graduates completed the new requirement of **Chemistry 495 *"Senior Chemistry Applications"***

This course required the students to work on all aspects of an advanced chemistry research project. The course objectives were as follows: to develop a research proposal based on a current literature search, perform the research as described in the proposal, present the results, analyze and present results of the research both orally and as a written report.

The students' grades were determined based on the initial proposal, experimental work, the oral presentation, and the written report. Each of these four areas counted toward counted as 25 % of the final grade.

Student	Proposal	Presentation	Research	Report	Grade
2007					
S1	B	C	A	A	B
S2	B	A	B	B	B
S3	B	A	A	B	B
2008					
KB	B	A	A	A	A
JG	A	A	A	A	A
GP	B	A	A	A	A
GR	B	A	A	A	A
CU	B	A	A	A	A

Results indicate that the objectives of Outcome #2 have been met.

Second Means of Assessment of Outcome #2: Involvement of students in research projects allows the faculty to ascertain student achievement in the areas of work ethics, instrumentation usage, safety, problem solving, project completion abilities and the utilization of basic chemical knowledge.

> *Criterion for Achievement of Outcome #2, First Means of Assessment:* While it is difficult to subjectively measure student success in faculty-sponsored research, we feel that students are successful with respect to this outcome solely through the participation in research projects. Therefore, student outcomes are considered met if students engage in research and present their findings at Professional Meetings and/or Departmental Seminars.

Data: In fact all majors have participated in research with faculty: All three graduates Balizan, Brookshier, and Whitehead took at least one credit of CHEM 499 in addition to CHEM 495. See table for outcome 3 for list of student research advisors. Note: even though two students took no CHEM 2/499, all did research in 495.

Academic Year	Student Name	Chem 2/499
2007	Balizan	2
	Brookshier	1
	Whitehead	8
2008	Chumo	8
	Mulroy	10
2009	Gallegos	6
	Herrera	0
	Ulibarri	0

Outcome #3: NMHU Bachelor of Science Chemistry graduates should have the maturity and the work ethic to succeed as a professional chemist or in a related technical discipline.

Means of Assessment of Outcome #3: The chemistry faculty considers this to be an important method of evaluation of the effectiveness of the program. We recognize the need for a mechanism to gauge student progress following graduation from the program. Therefore, we are developing an exit evaluation which students will be asked to complete upon graduation. Information obtained from the evaluation will then be used to improve program content and design.

DATA: History and Employment Status of Graduates

Undergraduates Majors	**Yr. Grad.**	**Status**	**Research Advisor**	**In Chem field***	**BA/ BS**
Michael Long	5/2001	PhD earned from Penn State	Helv.	Yes	BS
Michael C de Baca	5/2002	Earned MS in Chemistry at NMSU, was accepted into PhD program but elected to take a synthetic chemistry with a pharmaceutical co. in Boston.	Sammeth	Yes	BS
Genevieve Kuhn	5/2002	Chemist w/ desiccant firm >5 yr, last contact was considering patent law.	Clark	Yes	BS
Tiffany Kinnibrugh	5/2003	PhD program @ TAMU	Timofeeva	Yes	BS
Christine Montoya	5/2003	Got pharmacy degree, maybe PhD in NM	Sammeth	Yes	BS
Elizabeth Archuleta	5/2006	Completing Ms @ NMHU, works as chemist Alb	Helv/Mart	Yes	BS
Elizabeth Balizan	5/2007	In PhD program at U. South Carolina	Helv.	Yes	B?
David Brookshier	5/2007	In MS @ NMHU	Sam/Mart	Yes	B?
James Whitehead	5/2007	Completed Special Ed degree recently,	Helv.	Yes	X
Nicholas Chumo	7/2007	food color manufacturing comp, St Louis, Chem tech	Martinez	Yes	X
Joseph Mulroy	12/2007	MS program @ NMHU	Timofeeva	Yes	BA
Chemistry Minors					
Sean Murphy	5/2008	Pursuing chemistry PhD at Notre Dame		Yes	BS math

*Work in or was last known to be in a field related to their degree at NMHU.