MSU Departmental Assessment Report
Spring 2010

Department: Land Resources and Environmental Sciences

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Assessment Coordinator: Cathy Zabinski

Date: August 13, 2010

Degrees/Majors/Options Offered by Department

B.S. Degrees in:

1. Environmental Sciences
   - Soil and Water Science Option
   - Environmental Biology Option
2. Geospatial and Environmental Analysis Option
3. Land Rehabilitation
4. Sustainable Food and Bioenergy Systems
   - Agroecology Option

M.S. Degrees in:

Land Resources and Environmental Sciences
Land Rehabilitation
Entomology (cross-departmental within College of Agriculture)

Ph.D. Degree in:

Ecology and Environmental Sciences (cross-college)

Assessment Activities Report
Land Resources and Environmental Sciences Department
August 13, 2010

The assessment of LRES majors has been overseen by the Departmental Curriculum Committee. During the 2009-10 academic year, the curriculum committee defined learning outcomes for each of our five majors (Figure 1). The most useful part of this process was the ensuing discussion regarding the content of individual classes, and faculty member's perception of how their course fits into the overall training. The articulated list of learning outcomes is a way to put on paper the structure that we have used since the inception of LRES in designing and annually reviewing the majors. Learning outcomes were reviewed by Drs. Tara Gray and Jean Conway at NMSU in Las Cruces, NM to gain feedback on this diagram's structure and content; comments were positive that we are on the right track.

The next step of the assessment, to be undertaken by a subset of the curriculum committee, will be to describe the learning outcomes for each of the LRES courses, and how they contribute to our list for each of our majors. This will provide a framework for all faculty in designing new courses and for making adjustments to courses that are already being taught. This structure is particularly important because we have three new faculty hires joining the department during the 2009-2010 academic year.

Data Collected

Our Instructional Programs Coordinator (Linda McDonald) continues to take the lead in providing and documenting recruitment, orientation, advising, support, progress facilitation, records maintenance, and advising/exit interview activities for students at the undergraduate and graduate levels. The department currently uses two assessment instruments: 1. Exit Interview – Undergraduates and 2. Exit Interview - Graduate student.

Table 1. Exit Interview Response rates from LRES students

Year	Undergraduate students			Graduate students		
	Number graduating	Number returned	% forms returned	Number graduating	Number returned	% forms returned
2004	na	na	Na	16	9	56
2005	28	10	36	14	6	43
2006	31	9	29	8	4	50
2007	18	9	50	13	3	23
2008	14	6	15	5	3	60
2009	13	3	23	7	2	29
2010	10	8	80	6	1	17
Average			39			41

Exit Interviews from the past 10 years were summarized so they can be reviewed by an assessment committee during the upcoming year.

Our primary method of assessment of our student majors has been by monitoring performance of our students in the LRES capstone course. The course is a 2-semester sequence, during which students work in small groups to define, develop and carry out a research program related to plant, soil and water aspects of an applied management scenario. To do this, students are required to work independently and with other students to synthesize information from across the curriculum. At the end of the second semester, students present a final report and present their results to the department and the broader MSU community. Although more qualitative than quantitative, we have used overall performance of the students in this course sequence to gauge their overall scientific training, evaluate their synthesis skills, and review their oral and written communication abilities.

The changes we have made during the 2009-2010 year to our assessment procedure is the development of the Learning Outcomes for each of the majors, and identifying the need for a separate Assessment Committee, that will formalize the approaches we have enacted over the years.

Figure 1. Learning Outcomes for each of the LRES Undergraduate Majors (attached)

Environmental Biology
Knowledge:

- general comprehension of, and an ability to integrate, the soil science sub-disciplines, various core chemistries, and biological sciences (micro and macro) towards understanding ecosystem-level ecology as it applies to managing and improving agricultural, natural, and disturbed environments.
- understand the foundational principles that govern and explain how key biological entities and their activities integrate with environmental abiological elements to influence ecosystem function in natural and disturbed environments.

Skills:

- working knowledge of traditional and contemporary (e.g., molecular) approaches used to study organisms in natural or disturbed environments
- ability to apply these approaches to analyze the biology of environments, especially to design solutions to environmental problems
- ability to read scientific literature critically and develop rationale opinions about environmental biology in natural and disturbed settings
- capable of integrating diverse fundamental principles derived from core contributing disciplines towards managing and sustaining natural and agricultural

Soils and Water

- To gain understanding of the physical, chemical and biological aspects and interactions in environmental soil and water systems;
- To apply an understanding of soil and water processes to address societal and environmental needs in natural, managed and disturbed ecosystems.

General LRES Learning Outcomes
Knowledge:

- To gain a broad understanding of core areas of science important to environmental sciences (i.e., biology, chemistry, and physics);
- To gain a broad based knowledge of land resource systems, including soils, plants and aquatic systems, and ecologic interactions within and among these systems.
- To gain a perspective on how to apply environmental science-based knowledge to natural resource management issues

Skills:

- To read and interpret primary literature in environmental sciences and related areas.
- To design a research/resource project that builds on environmental science knowledge from coursework and primary literature.
- To gain a basic working knowledge of the theory and practice of data analysis and presentation in the environmental sciences, including data compilation, statistical analyses, model building, and graphical representation of data;
- To write professional-quality scientific reports, including objectives, methods, results, discussion, and references;
- To prepare and make oral presentations of scientific results to both scientific and general audiences;
- To work in multidisciplinary teams; and
- To assess the quality and source of information using critical thinking and analysis skills.

Attitudes:

- To appreciate that solving environmental problems requires inter-disciplinary approaches;
- To appreciate that science-based solutions to environmental problems won't work unless there is consideration for stakeholders;
- To appreciate that conducting and applying environmental science has ethical implications.
- To appreciate that the study of environmental biology requires a holistic approach to understanding that organisms (microscopic or macroscopic) depend on, and interact with, abiological components of their environment.

Land Rehabilitation
Knowledge

- Increase comprehension of the interactions among microorganisms, plants, soil and water as they pertain to reclamation and restoration sciences.
- Increase comprehension of experimental design required to gain an understanding of the ecological factors determining the outcome of land rehabilitation/restoration.
- Gain an understanding of practices used to rehabilitate/restore degraded land.

Skills:

- Students will be able to apply scientific methods for assessing site conditions and monitoring responses to land subject to, or planned for rehabilitation/restoration.
- Students will be able to write scientific reports including GIS products relevant to land rehabilitation/restoration requirements.
- Students will have a working knowledge of laws, regulations and policies associated with land rehabilitation, restoration and reclamation.

Geospatial and Environmental Analysis
Knowledge:

- Underlying principles of geospatial technologies, including geographic information systems (GIS), global positioning system (GPS), and remote sensing
- Integrated landscape inventory and analytical processes
- Statistical techniques for analyzing landscape inventory attributes
- Theories of holistic thought
- Social science context for landscape management decisions

Skills:

- Application of GPS, remote sensing, and GIS to locate and measure features and their attributes on landscapes
- Set up and conduct integrated inventories of land and human resources on landscapes using geospatial tools
- Make conclusions about quantitative landscape system inputs and outputs
- Make management recommendations for landscape systems that engage natural science attributes within human dimension social and economic realities

Agroecology
Knowledge:

- To understand how food systems work from production of raw produce and commodities to processing, to distribution and to consumers.
- To understand the energy requirements and efficiencies in food systems.
- To understand principles of sustainable nutritious food production at the market garden scale and large scale farms.
- To understand how ecological principles can be applied to agricultural production.

Skills (be able to):

- Conduct life-cycle analysis on agricultural products in a food system chain from farm to consumer.
- Apply ecological principles to agricultural pest, nutrient and soil management.
- Manage a sustainable productive market garden for a CSA or other local distribution system.