

P. Academic Program Outcomes Assessment

The College of Agriculture and Life Sciences developed a set of learning outcomes in 2002 for graduates from all departments within the college. These outcomes were updated in 2007 and identify that graduates should have skills and abilities in the following eight areas:

- 1) Professional, Interpersonal and Cross-cultural Communications** (speak and write clearly and persuasively, prepare effective visual, oral, written and electronic presentations, and effectively read, listen, observe and reflect);
- 2) Problem-Solving/Critical Thinking** (apply a holistic approach to solving complex issue laden problems, apply a rational and objective process to distinguish verifiable facts from value claims, determine the accuracy of statements, identify assumptions and detect bias, distinguish relevant from irrelevant information, establish priorities, summarize, analyze, and interpret simple research data and policy issues, and critically evaluate their own arguments and those of others);
- 3) Leadership** (organize, facilitate, and participate effectively in a group, team, or organization, define a problem or opportunity, implement an action planning process, work toward a goal and justify actions taken);
- 4) Entrepreneurship** (demonstrate innovativeness and creativity regardless of context, identify and pursue opportunities that produce value, be persistent in shepherding necessary resources and managing associated risk to facilitate change);
- 5) Life-long Learning** (articulate how continued learning after graduation will enrich their lives, identify and participate in new areas for learning beyond the classroom and after graduation);
- 6) Ethics** (define and assess their ethical perspective, moral responsibility, and values, identify and critically evaluate contemporary ethical and moral issues in professional and private life);
- 7) Environmental Awareness** (explain the physical and biological interactions within ecosystems, explain how human activities impact the environment and how societies are affected by environmental change); and
- 8) International/Multi-Cultural Awareness** (ISU Faculty Senate outcomes for U.S. Diversity and International Perspectives).

The Iowa Board of Regents' 2010 Strategic Plan called for development of outcomes assessment programs and targets for collecting and using assessment results by June of 2011. During 2011, the College of Agriculture and Life Sciences developed a plan based on a seven-year calendar cycle in response to the Regent's directive; the college has subsequently been collecting attainment data from all departments which began in June 2012. The departments are charged with developing their own assessment programs that align with those of the college, including outcomes that are consistent with (but not necessarily identical to) the college's set of eight outcomes.

The NREM department began work with an ad-hoc Outcomes Assessment Committee in 2003. This committee arranged a series of workshops and a departmental retreat with on-campus scholars in curriculum development and assessment (Drs. Brad Skaar, Animal Science, and Barb Licklider and Mary Huba, both from Educational Leadership and Policy Studies) and generated an initial list of ten outcomes for all NREM graduates. This list was updated in 2008 and approved by vote of the department faculty (in response to the college outcomes revision process) and currently includes the following twelve general program outcomes and the characteristics of graduates who have attained them:

1. Identify, explain and critically evaluate their own beliefs, values and actions in relation to professional and societal standards of ethics.

For any given situation, graduates identify, critically evaluate, and state their own beliefs and values as they relate to professional and societal ethical standards, for any given situation. They

elaborate on how those values and beliefs impact their actions, and they explain which specific canons or principles of a professional code of ethics are applicable to a particular situation.

2. Anticipate, analyze and evaluate natural resource issues and opportunities, explaining ecological, economic, and social consequences of natural resource actions at various scales and over time.

In the case of existing natural resource issues, graduates explain the ecological, economic, and social consequences that reasonably could be expected to occur as the result of actions taken to address the issue. The explanation includes considerations of the geographic area influenced by the issue as well as the time frame over which the consequences can be expected to occur. In the case of evolving circumstances, graduates predict natural resource issues that may arise as a result of the circumstances and explain the ecological, economic and social consequences of those issues.

3. Actively seek the input and perspectives of diverse stakeholders regarding natural resource problems and issues.

Graduates identify the comprehensive list of individuals or groups who may be impacted by particular natural resource problems and issues. They are well-versed in techniques for seeking and incorporating input and perspectives from those people, and they incorporate those inputs and perspectives into the decision making process.

4. Assess, analyze, synthesize, and evaluate information fairly and objectively.

Not all information is equally sound or applicable in a particular situation. Graduates evaluate the validity and importance of information obtained from any source. Once evaluated, they use the information appropriately in the solution of natural resource problems.

5. Work effectively, both individually and with others, on complex, value-laden natural resource problems that require holistic problem solving approaches.

Effective solution of natural resource problems often involves input from diverse constituencies with diverse value scales. When working individually, graduates incorporate those values into the solution of problems. Graduates work effectively with diverse individuals and groups to reach consensus on problem solutions.

6. Formulate and evaluate alternative solutions to complex problems and recommend and defend best alternatives.

The natural resource base with which we deal is capable of providing numerous goods and services to numerous publics. Graduates formulate multiple alternatives, as well as action plans, to achieve stakeholder objectives. They evaluate each of the feasible alternatives in terms of biological possibility, economic feasibility and social acceptability. They recommend best alternatives based on the stakeholders' objectives, and they justify their recommendations on the basis of sound science.

7. Communicate clearly and effectively with all audiences using appropriate oral, visual, electronic, and written techniques.

Graduates utilize the best form, or forms, of communication for effectively conveying information to, or seeking input from, a particular audience. They are proficient in all forms of communication, and adjust their style or technique of communication to suit different audiences.

8. Recognize and interpret resource problems and opportunities across spatial scales from local to global.

Graduates recognize where resource problems and opportunities can or could exist, and they evaluate and interpret these for others. They evaluate and interpret for individual landowners at a very local scale as well as for problems that span multiple ownerships, regions and ecosystems.

9. Appreciate cultural diversity and understand the impact of the global distribution of people and wealth on natural resource use and valuation.

Different cultures, population densities, and income classes value and use natural resources in very different ways. Because natural resources often are used simultaneously by different groups, it is important for graduates to be able to account for those differing uses and valuations when making management decisions about natural resources.

10. Exercise leadership skills as professionals and engaged citizens

Graduates organize, facilitate, and participate effectively in groups, teams, or organizations. They define problems or opportunities, implement action planning processes, work toward goals and justify actions taken.

11. Demonstrate creativity and innovation in identifying and pursuing opportunities that produce environmental, social, or economic value.

Graduates display creativity in a variety of situations, and identify opportunities to promote understanding of natural resource issues. They demonstrate persistence when working with individuals who have diverse interests in order to build consensus and facilitate accomplishing stated objectives.

12. Exercise life-long learning skills developed before graduation.

Graduates articulate why life-long learning is important. Graduates find answers to their questions as they arise throughout life. They are capable of determining what they need to know to effectively deal with an issue or situation, and they know how to obtain the necessary knowledge. They have learned how to learn in the absence of teachers.

During 2003-2008, NREM used an indirect approach to measuring outcomes by administering surveys to recent graduates (annually distributed to those who graduated both two and five years prior to survey administration) and their employers (every fourth year), asking them to rate their own (or their employees') preparation and skill development related to each outcome. We used data from this effort as a focal point during a faculty retreat in August 2009 to prioritize and adjust our approach to pursue more direct assessment methods.

Following the 2009 retreat, the NREM Outcomes Assessment Committee pursued a direct, summative approach (for a full description of the program and links to the matrix for each major, rubrics used, and other information about program structure please see also: <http://www.nrem.iastate.edu/assessment>). First, an assessment matrix was developed for each major identifying courses (at both early and late curricular stages) in which student work would be evaluated. Instructors of those courses then indicated which outcomes their courses addressed most directly. The Outcomes Assessment Committee then developed a common set of rubrics for faculty members to use in measurement of student progress toward attainment. Rubrics have been developed and applied for eight of the 12 outcomes to date [anticipating analyzing, and evaluating natural resource issues (Outcome #2, above), assessing, analyzing, synthesizing, and evaluating information fairly and objectively (Outcome #4), working effectively individually and with others (Outcome #5), formulating and evaluating alternative solutions to complex problems and recommending and defending best alternatives (Outcome #6), communication skills (Outcome #7), recognizing and interpreting resource problems and opportunities across spatial scales from local to global (Outcome #8) exercising leadership skills (Outcome #10), and exercising life-long learning skills (Outcome #12)]. Results each year have been reported to faculty and to the college.

The Outcomes Assessment Committee reports each year's results to the NREM faculty as a whole for discussion of whether students are attaining adequate competency in these areas, and, if not, what actions can be taken in our courses to provide additional practice and lead to skill improvement. We are also in the process of developing a new approach to assessment for required student work experiences (NREM 104) that will integrate student self-reporting (indirect assessment of Outcomes # 1, 5, 6, 10, and 12) and employer reporting (direct assessment of Outcomes # 5, 6, 7, and 12) using standardized assessment instruments.