

Academic Assessment Report

BEST PRACTICES IN STUDENT LEARNING OUTCOMES

(M.S. / CROP, SOIL, and ENVIRONMENTAL SCIENCES)

(MAY 2019)

Contact

Robert Bacon, Dept Head
Crop, Soil, and Environmental Sciences Dept.
115 Plant Science Bldg
479-575-5715
rbacon@uark.edu

CSES Mission

The mission of the Department of Crop, Soil, and Environmental Sciences is to provide superior education programs at the undergraduate and graduate levels, conduct innovative research and extension programs in the crop, soil, and environmental sciences and provide superior service for citizens of Arkansas and the nation.

Program Goals

(Program goals are broad general statements of what the program intends to accomplish and describes what a student will be able to do after completing the program. The program goals are linked to the mission of the university and college.)

1. Graduates have the discipline-specific knowledge in crop, weed, soil, water, and environmental sciences required to perform successfully in appropriate-level private, government, or academic positions.
2. Graduates are able to critically analyze, synthesize, and evaluate new information to make informed decisions.
3. Graduates have the ability to solve complex, multidisciplinary problems.
4. Graduates are able to prepare and synthesize information to effectively communicate, both orally and in writing, with technical or scientific and non-technical audiences.
5. Graduates have expertise in research and analytical skills through completion of a thesis research project.

Student Learning Outcomes

(Student Learning Outcomes are defined in terms of the knowledge, skills, and abilities that students will know and be able to do as a result of completing a program. These student learning outcomes are directly linked to the accomplishment of the program goals.)

1. Students will demonstrate the appropriate depth and breadth of discipline specific knowledge required to function as advanced crop, weed, environmental, soil, or water science professionals.
2. Students will demonstrate the ability to critically evaluate situations or scenarios to arrive at well thought out and supported decisions and outcomes.
3. Students will demonstrate the ability to work through and solve complex, multidisciplinary problems.
4. Communication skills
 - a. Students will demonstrate the skills required to effectively communicate technical/scientific information in oral platforms to general and professional audiences.

- b. Students will demonstrate the ability to integrate, organize, and effectively present written reports of technical/scientific information to general and professional audiences.
5. Students will demonstrate mastery of research and analytical skills (e.g. conceptual, statistics, laboratory or field skills, etc.) required to function as advanced crop, weed, environmental, soil, or water science scientists.

Assessment Measure for Outcome 1

- Achievement will be measured at the completion of a student's program during the **thesis defense, scored using a rubric.**
- This is a **direct** measure of student learning.
- Depth and breadth of discipline specific knowledge learned will be assessed through oral questions posed by a thesis examination committee. The length of the defense and number and type of questions will be subject to the committee's discretion based on the student's background and research focus and responses to questions.
- The rubric used for scoring is attached to this assessment plan.

Acceptable and Ideal Targets (not required for indirect measures).

- Acceptable: 70% of M.S. students defending their thesis will score "proficient" or greater.
- Ideal: 90% of M.S. students defending their thesis will score "proficient" or greater.

Key Personnel (who is responsible for the assessment of this measure).

- Graduate advisory / thesis examination committee is the responsible party.
- We aim to capture at least 50% of graduating students.

Summary of Findings

- Twenty CSES Graduate Student Learning Objectives (SLO) Assessment rubrics were completed for six different CSES M.S. students. Among the rubrics completed, faculty indicated basic to mastery level of discipline specific knowledge with the proficient average (3.2) and median (3.0) scores. When averaging scores by student, four of the six students scored greater than the 3.0 value indicating proficiency in the discipline specific knowledge and 90% of assessor rubrics completed indicated that students were at a proficient level for a M.S. degree.
- Our limited sample size indicates that M.S. graduates tend to have an adequate grasp of knowledge; however, a minor proportion of students may have trouble answering some important questions related to their field upon degree completion.

Recommendations

- More CSES Graduate SLO Assessment rubrics have been completed this past year than any other since the implementation of these rubrics. The use of CSES Graduate SLO Assessment rubrics among faculty at or after M.S. thesis defenses seems to be becoming an established practice for assessment.
- Continued use of the CSES Graduate SLO Assessment rubric should establish whether discipline specific knowledge is an area of proficiency or highlight any changes with time.

Assessment Measure for Outcome 2

- Achievement will be measured at the completion of a student's program during the **thesis defense, scored using a rubric.**

- This is a **direct** measure of student learning.
- Ability to think critically will be evaluated through oral questions posed by a thesis examination committee. The length of the defense and number and type of issues and scenarios posed to the student to evaluate critical thinking ability will be subject to the committee's discretion based on the student's background and research focus and responses to questions.
- The rubric used for scoring is attached to this assessment plan.

Acceptable and Ideal Targets (not required for indirect measures).

- Acceptable: 70% of M.S. students defending their thesis will score "proficient" or greater.
- Ideal: 90% of M.S. students defending their thesis will score "proficient" or greater.

Key Personnel (who is responsible for the assessment of this measure).

- Graduate advisory / thesis examination committee is the responsible party.
- We aim to capture at least 50% of graduating students.

Summary of Findings

- Twenty CSES Graduate Student Learning Objectives (SLO) Assessment rubrics were completed for six different CSES M.S. students. Among the rubrics completed, faculty indicated basic to mastery level for critical thinking with an average just below proficient (2.9) and median at proficient (3.0) scores. When averaging scores by student, half of the six students scored at least the 3.0 value indicating proficiency for critical thinking and 65% of assessor rubrics completed indicated that students were at a proficient level for a M.S. degree.
- Assessment at the thesis defense by examination committees using the CSES Graduate SLO Assessment rubrics indicates that about half of the M.S. graduates are proficient at critical thinking skills and half need to continue to develop those skills.

Recommendations

- Critical thinking requires higher level cognitive skills, including analysis, synthesis and evaluation and as such it is more difficult to achieve proficiency and mastery. Thus, it may not be surprising that average and median ratings are a bit lower than those for discipline specific knowledge. The CSES faculty need to continue to monitor assessment results to determine if they reflect the M.S. population and whether changes may be required for those few students who do not indicate proficiency at the conclusion of their M.S. program. While CSES faculty need to be cautious about extrapolating assessment results to the general M.S. population at this juncture and should continue to collect data to determine if education is adequate for most students to fully develop critical thinking skills, initial trends are that critical thinking skills is an area that could benefit from curriculum development.

Assessment Measure for Outcome 3

- Achievement will be measured at the completion of a student's program during the **thesis defense, scored using a rubric.**
- This is a **direct** measure of student learning.
- Ability to think logically and progressively through multiple dimensions of a complex scenario or issue to solve problems will be evaluated through oral questions posed by a thesis examination committee. The length of the defense and number and type of issues and scenarios posed to the student to evaluate problem solving ability will be subject to the committee's discretion based on the student's background and research focus and responses to questions.

- The rubric used for scoring is attached to this assessment plan.

Acceptable and Ideal Targets (not required for indirect measures).

- Acceptable: 70% of M.S. students defending their thesis will score “proficient” or greater.
- Ideal: 90% of M.S. students defending their thesis will score “proficient” or greater.

Key Personnel (who is responsible for the assessment of this measure).

- Graduate advisory / thesis examination committee is the responsible party.
- We aim to capture at least 50% of graduating students.

Summary of Findings

- Twenty CSES Graduate Student Learning Objectives (SLO) Assessment rubrics were completed for six different CSES M.S. students. Among the rubrics completed, faculty indicated basic to mastery level for problem solving ability with an average just below proficient (2.9) and median at proficient (3.0) scores. When averaging scores by student, half of the six students scored at least the 3.0 value indicating proficiency for problem solving ability and 65% of assessor rubrics completed indicated that students were at a proficient level for a M.S. degree.
- Assessment at the thesis defense by examination committees using the CSES Graduate SLO Assessment rubrics indicates that about half of the M.S. graduates are proficient at problem solving and will benefit from continued development of those skills.

Recommendations

- Problem solving requires comprehension, analysis, synthesis, and evaluation of potentially different kinds of information. While it is encouraging that some of the students have mastered achievement in problem solving, others are not as developed in those skills. CSES faculty need to be cautious in extending these results to the larger M.S. population at this juncture; however, the department needs to continue to collect data to determine if the best educational opportunities is being provided for all students to fully develop problem solving skills.

Assessment Measure for Outcome 4a

- Achievement will be measured at the completion of a student’s program during the **thesis defense, scored using a rubric.**
- This is a **direct** measure of student learning.
- Effective oral communication will be evaluated during a presentation and question and answer period during the thesis defense. The thesis advisory / examination committee will evaluate the delivery of presentation, effectiveness of visual aids, and quality and organization of content. The committee will also ask questions following the presentation. The length of the question and answer period (number and type of questions posed to the student) will be subject to the committee’s discretion based on the student’s background and research focus, presentation provided by the student, and responses to questions.
- The rubric used for scoring is attached to this assessment plan.

Acceptable and Ideal Targets (not required for indirect measures).

- Acceptable: 70% of M.S. students defending their thesis will score “proficient” or greater.
- Ideal: 90% of M.S. students defending their thesis will score “proficient” or greater.

Key Personnel (who is responsible for the assessment of this measure).

- Graduate advisory / thesis examination committee is the responsible party.
- We aim to capture at least 50% of graduating students.

Summary of Findings

- Twenty CSES Graduate Student Learning Objectives (SLO) Assessment rubrics were completed for six different CSES M.S. students. Among the rubrics completed, faculty indicated basic to mastery level for oral communication skills with an average above proficient (3.4) and median close to mastery (3.8) scores. When averaging scores by student, five of the six students scored at least the 3.0 value indicating proficiency for oral communication skills and 95% of assessor rubrics completed indicated that students were proficient oral communicators.
- Assessment at the thesis defense by examination committees using the CSES Graduate SLO Assessment rubrics indicates that most of the M.S. graduates are proficient at oral communicators and that developing oral communication skills is likely a strength of the CSES Department.

Recommendations

- CSES graduate students generally enroll in CSES 5103 Scientific Presentations where they learn how to construct and deliver effective oral presentations, must deliver a departmental seminar with a passing grade, and often give multiple oral presentations at scientific meetings. Thus, it may not be surprising that, even with a small sample size, graduate students demonstrate proficiency for oral presentation skills.
- Limited indications at this time suggest that CSES should continue with the current courses and programs developing oral communication skills.

Assessment Measure for Outcome 4b

- Achievement will be measured at the completion of a student's program during the **thesis defense, scored using a rubric.**
- This is a **direct** measure of student learning.
- Effective written communication skills will be evaluated through the written thesis. The thesis advisory / examination committee will evaluate the quality and organization of content, quality of references, style, and adherence to convention in writing, attention to detail, and overall effectiveness and credibility in delivery.
- The rubric used for scoring is attached to this assessment plan.

Acceptable and Ideal Targets (not required for indirect measures).

- Acceptable: 70% of M.S. students defending their thesis will score "proficient" or greater.
- Ideal: 90% of M.S. students defending their thesis will score "proficient" or greater.

Key Personnel (who is responsible for the assessment of this measure).

- Graduate advisory / thesis examination committee is the responsible party.
- We aim to capture at least 50% of graduating students.

Summary of Findings

- Twenty CSES Graduate Student Learning Objectives (SLO) Assessment rubrics were completed for six different CSES M.S. students. Among the rubrics completed, faculty indicated basic to mastery level for written communication skills with an average above proficient (3.3) and median score of proficient (3.0). When averaging scores by student, five of the six students

scored at least the 3.0 value indicating proficiency for written communication skills and 95% of assessor rubrics completed indicated that students were proficient at written communication.

Recommendations

- While CSES graduate students generally enroll in CSES 5103 Scientific Presentations, the Scientific Writing course has not been taught in several years. There is not as much opportunity to write during the curriculum as there are opportunities to present orally and present research posters. Thus, it remains to be determined if this early demonstration of written proficiency is reflective of the entire CSES graduate student body.
- Opportunities to communicate in written formats to diverse audiences should be encouraged throughout all graduate students' degree plan.

Assessment Measure for Outcome 5

- Achievement will be measured at the completion of a student's program during the **thesis defense, scored using a rubric.**
- This is a **direct** measure of student learning.
- Demonstration of mastery of research and analytical skills (e.g. conceptual, statistics, laboratory or field skills, etc.) will be assessed during the thesis defense. The thesis advisory / examination committee will evaluate the independence and quality of the student's development of skills in completion of the research through oral questioning in the thesis defense and reading of the written thesis. The length of the defense and number and type of questions will be subject to the committee's discretion based on the student's background and research focus and responses to questions.
- The rubric used for scoring is attached to this assessment plan.

Acceptable and Ideal Targets (not required for indirect measures).

- Acceptable: 70% of M.S. students defending their thesis will score "proficient" or greater.
- Ideal: 90% of M.S. students defending their thesis will score "proficient" or greater.

Key Personnel (who is responsible for the assessment of this measure).

- Graduate advisory / thesis examination committee is the responsible party.
- We aim to capture at least 50% of graduating students.

Summary of Findings

- Twenty CSES Graduate Student Learning Objectives (SLO) Assessment rubrics were completed for six different CSES M.S. students. Among the rubrics completed, faculty indicated basic to mastery level for research and analytical skills with an average (3.1) and median (3.0) demonstrating proficiency. When averaging scores by student, five of the six students scored at least the 3.0 value indicating proficiency for research and analytical skills and 90% of assessor rubrics completed indicated that students were proficient at research and analytical skills.

Recommendations

- Development of research and analytical skills is emphasized during the M.S. program; therefore, it may not be surprising that graduate students demonstrate proficiency in these skills. However, this year as in the previous year, a faculty member commented that it is difficult to instill the need to be personally inquisitive in M.S. students. Therefore, it remains to be seen if continued assessment indicates that initial results are reflective of the entire CSES graduate

student body throughout time. Continued assessment using the CSES SLO Assessment rubric is recommended.

Overall Recommendations

- The expectation is that the majority of students are receiving an excellent education and developing knowledge and skills to be proficient or demonstrate mastery as scientific professionals. However, assessment data are accumulating; this is the third year CSES has collected CSES SLO Assessment rubric assessment data. Assessment should continue in order to determine trends and whether a sufficient percentage of the student body is demonstrating proficiency in all stated learning outcomes or if there are systematic areas of weakness that need to be addressed in the curriculum.
- Early indications are that knowledge, oral and written communication skills and research and analytical skills are strengths for CSES and that critical thinking and problem solving are more difficult skills for students to develop. A few more years of data may reinforce that some new approaches to strengthen critical thinking and problem solving abilities may be worth investment.
- The CSES Department needs to continue to promote the collection of assessment data during graduate student defenses as a routine part of the process of completing a graduate degree. The update of the CSES Graduate Student Handbook, publishing of the CSES Graduate Student Handbook on the CSES website, and continual reminders from the CSES administrative office to faculty and students that students need to inform the departmental office of impending thesis defenses and get rubrics to their committee members has helped make implementation of these rubrics more commonplace. As this procedure becomes routine, the database of information about curriculum will become more valuable to faculty.

Action Plan

- To continue to institutionalize the implementation of assessment during defenses, the departmental practice of informing new graduate students about the CSES Graduate Student Handbook including that each CSES graduate student **must** inform the CSES Department (i.e. the CSES Department Head and CSES Office Manager) of a scheduled defense **two weeks prior** to the defense and obtain a "CSES Exit" packet that includes the CSES Graduate SLO Assessment rubric should continue and become routine. The promotion of this informal CSES policy has benefitted completion and return to Daniela Kidd in 115 PTSC of the CSES Graduate SLO Assessment rubrics.
- Each Advisory Committee member needs to be reminded that these rubrics are for curriculum and program assessment and are not returned to the individual graduate student. Comments written directly to the students will not be received by the individual student. Assessments are compiled for understanding at the program level and data are reported anonymously.

Supporting Attachments

- CSES Graduate SLO Assessment rubric adapted from multiple Association of American Colleges and Universities rubrics (e.g. critical thinking, problem solving, oral and written communication skills, etc.)