# Academic Assessment Report

## BEST PRACTICES IN STUDENT LEARNING OUTCOMES
## (Ph.D. / CROP, SOIL, and ENVIRONMENTAL SCIENCES)
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**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 depth and breadth of 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 contribute to the advancement of science through creation of original and independent ideas and research.

**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 expert 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 contribute to the advancement of science by acquiring skills (e.g. conceptual, statistics, laboratory or field skills, etc.) to fulfill project requirements to generate original and independent research data.

**Assessment Measure for Outcome 1**

- Achievement will be measured at the completion of a student's program during the **dissertation 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 dissertation advisory/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** (<u>not required</u> for indirect measures).

- Acceptable: 70% of Ph.D. students defending their dissertation will score "proficient" or greater.
- Ideal: 90% of Ph.D. students defending their dissertation will score "proficient" or greater.

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

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

**Summary of Findings**

- There were a limited number of CSES Graduate Student Learning Objectives (SLO) Assessment rubrics completed during 2017-2018. However, of the rubrics completed, faculty indicated mastery of discipline specific knowledge. One evaluator commented that the PhD student was "one of the strongest weed science students" and was going to leave a "lasting imprint on other graduate students".

**Recommendations**

- The CSES faculty are slowly adjusting to the new practice of implementing student learning outcome assessment at dissertation defenses by completing the CSES Graduate SLO Assessment rubric. While faculty have been slow to adopt this practice, it appears to be gaining traction.
- Our limited sample size indicates that Ph.D. graduates have a solid grasp of knowledge related to their field upon degree completion; however, we need to be cautious about extending results to the general Ph.D. population at this juncture.

**Assessment Measure for Outcome 2**

- Achievement will be measured at the completion of a student's program during the **dissertation 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 dissertation 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** (<u>not required</u> for indirect measures).
- Acceptable: 70% of Ph.D. students defending their dissertation will score "proficient" or greater.
- Ideal: 90% of Ph.D. students defending their dissertation will score "proficient" or greater.

**Key Personnel** (who is responsible for the assessment of this measure).
- Graduate advisory / dissertation examination committee is the responsible party.
- We aim to capture at least 50% of graduating students.

**Summary of Findings**
- For the limited number of rubrics completed, CSES Ph.D. students rate between proficient and advanced/mastery for critical thinking.

**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 encouraging that ratings in critical thinking are high; however, we need to be cautious about extending results to the general Ph.D. population at this juncture. CSES needs to continue to collect data to determine if education is adequate for most students to fully develop critical thinking skills.

**Assessment Measure for Outcome 3**
- Achievement will be measured at the completion of a student's program during the **dissertation 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 dissertation 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** (<u>not required</u> for indirect measures).
- Acceptable: 70% of Ph.D. students defending their dissertation will score "proficient" or greater.
- Ideal: 90% of Ph.D. students defending their dissertation will score "proficient" or greater.

**Key Personnel** (who is responsible for the assessment of this measure).
- Graduate advisory / dissertation examination committee is the responsible party.
- We aim to capture at least 50% of graduating students.

**Summary of Findings**
- For the rubrics completed, CSES Ph.D. students rate between proficient and advanced/mastery for problem solving.

**Recommendations**

- Problem solving requires comprehension, analysis, synthesis, and evaluation of potentially different kinds of information. While it is encouraging that achievement in problem solving seems to be at least proficient, CSES faculty need to be cautious in extending these results to the larger Ph.D. population at this juncture, and the department needs to continue to collect data to determine if education is being provided for 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 **dissertation 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 dissertation defense. The dissertation 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** (<u>not required</u> for indirect measures).

- Acceptable: 70% of Ph.D. students defending their dissertation will score "proficient" or greater.
- Ideal: 90% of Ph.D. students defending their dissertation will score "proficient" or greater.

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

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

**Summary of Findings**

- For the rubrics completed, CSES Ph.D. students show mastery in oral communication skills. 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, the rating indicated mastery for oral presentation skills.

**Recommendations**

- CSES faculty need to be cautious in extending these results to the larger Ph.D. population at this juncture, and the department needs to continue to collect data to assess achievement among Ph.D. graduate students.

**Assessment Measure for Outcome 4b**

- Achievement will be measured at the completion of a student's program in writing the **dissertation, scored using a rubric.**
- This is a ***direct*** measure of student learning.
- Effective written communication skills will be evaluated through the written dissertation. The dissertation 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** (<u>not required</u> for indirect measures).

- Acceptable: 70% of Ph.D. students defending their dissertation will score "proficient" or greater.
- Ideal: 90% of Ph.D. students defending their dissertation will score "proficient" or greater.

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

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

**Summary of Findings**

- For the rubrics completed, CSES Ph.D. students rated between proficient to mastery in written communication skills. 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 these scores are reflective of the entire CSES graduate student body.

**Recommendations**

- CSES faculty need to be cautious in extending these results to the larger Ph.D. population at this juncture, and the department needs to continue to collect data to assess achievement among Ph.D. graduate students.

**Assessment Measure for Outcome 5**

- Achievement will be measured at the completion of a student's program during the **dissertation defense, scored using a rubric.**
- This is a ***direct*** measure of student learning.
- Contribution to the advancement of science of original and independent research and ideas and will be assessed during the dissertation defense. The dissertation advisory / examination committee will evaluate the quality of research and contribution of the scholarship to the advancement of science and the initiative, independence and quality of the student skills development in completion of the research through oral questioning in the dissertation defense and reading of the written dissertation. 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** (<u>not required</u> for indirect measures).

- Acceptable: 70% of Ph.D. students defending their dissertation will score "proficient" or greater.
- Ideal: 90% of Ph.D. students defending their dissertation will score "proficient" or greater.

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

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

**Summary of Findings**

- For the rubrics completed, CSES Ph.D. students rated at the level of mastery for developing essential skills and contributing to the advancement of science through production of original and independent research. The Ph.D. program is based strongly on production of dissertation research that requires skills development and production of novel, publishable research that contributes to the advancement of the student's discipline. Thus, the student has multiple years to develop and refine relevant skills for utilization in science.

**Recommendations**

- While the results from the rubric are encouraging, given the limited dataset, CSES needs to continue to collect data to assess achievement among Ph.D. graduate students.

**Overall Recommendations**

- At this time, data are limited to draw conclusions about program effectiveness and derive recommendations to proceed in the future. 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, with limited data, it is difficult to determine if sufficient percentage of the student body is doing so in all stated learning outcomes.
- Continued assessment data collection using the CSES Graduate SLO Assessment rubric is recommended.

**Action Plan**

- Inclusion of the CSES Graduate SLO Assessment rubric in the CSES Graduate Student Handbook needs to occur so that all incoming students are fully aware of student learning outcomes for the Ph.D. program.
- To institutionalize the implementation of assessment during dissertation defenses, a department policy should be developed where each CSES graduate student **must** inform the CSES Dept (i.e. the CSES Dept Head and CSES Office Manager) of a scheduled defense **two weeks prior** to the defense and obtain a "CSES Exit" packet. Among other items, the CSES Exit packet has the CSES Graduate SLO Assessment rubric for each Advisory Committee member to complete and return to Daniela Kidd in 115 PTSC.
- The CSES Dept needs to increase rates of CSES Graduate SLO Assessment rubric completion and collection during 2018-2019 in order to compile a more complete baseline dataset of competency levels among Ph.D. graduate students.

**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.)