

# **Academic Assessment Report**

## **BEST PRACTICES IN STUDENT LEARNING OUTCOMES**

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

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#### **Contact**

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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 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**

- Ten CSES Graduate Student Learning Objectives (SLO) Assessment rubrics were completed for four different CSES M.S. students. Among the rubrics completed, faculty indicated basic to mastery level of discipline specific knowledge with the average between proficient and mastery and the median closer to mastery.
- Our limited sample size indicates that M.S. graduates tend to have an adequate grasp of knowledge; however, they may have trouble answering some important questions related to their field upon degree completion.

#### **Recommendations**

- The CSES faculty are slowly adjusting to the new practice of implementing student learning outcome assessment at M.S. thesis defenses by completing the CSES Graduate SLO Assessment rubric. While faculty have been slow to adopt this practice, it appears to be gaining traction.
- Continued use of the CSES Graduate SLO Assessment rubric should highlight whether discipline specific knowledge is an area of proficiency or concern that may need greater exploration to uncover and remedy for future students.

#### **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**

- Ten CSES Graduate SLO Assessment rubrics were completed for four different CSES M.S. students. Among the rubrics completed, faculty indicated basic to mastery for critical thinking with the average and median ratings indicating proficiency among graduates.
- Our limited sample size indicates that M.S. graduates tend to display an adequate ability in critical thinking; however, not all students may have fully developed these 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. However, 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.

**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**

- Ten CSES Graduate SLO Assessment rubrics were completed for four different CSES M.S. students. Among the rubrics completed, faculty indicated basic to mastery for problem solving with the average and median ratings indicating proficiency among graduates.
- Our limited sample size indicates that M.S. graduates tend to display an adequate ability in problem solving; however, not all students may have fully developed these skills.

#### **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 proficient among the majority, CSES faculty need to be cautious in extending these results to the larger M.S. population at this juncture. The department needs to continue to collect data to determine if education 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**

- Ten CSES Graduate SLO Assessment rubrics were completed for four different CSES M.S. students. Among the rubrics completed, faculty indicated proficiency to mastery in oral communication skills with the average and median ratings indicating proficiency among graduates.
- 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.

### **Recommendations**

- 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**

- Ten CSES Graduate SLO Assessment rubrics were completed for four different CSES M.S. students. Among the rubrics completed, faculty indicated developing/basic to mastery in written communication skills with the average in proficiency and median ratings at the mid-point between proficiency and mastery.

### **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 ranges and these scores are reflective of the entire CSES graduate student body.

### **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**

- Ten CSES Graduate SLO Assessment rubrics were completed for four different CSES M.S. students. Among the rubrics completed, faculty indicated developing/basic to mastery level research and analytical skills with the average at the mid-point between proficiency and mastery and median in proficiency ratings.

**Recommendations**

- Development of research and analytical skills is emphasized during the M.S. program; therefore, it may not be surprising that, even with a small sample size, graduate students demonstrate proficiency in these skills. However, one faculty member did comment 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 the average and median ratings are reflective of the entire CSES graduate student body. 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 remain limited and collection should be continued to determine if sufficient percentage of the student body is demonstrating proficiency in all stated learning outcomes.
- 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.

**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 M.S. program.
- To institutionalize the implementation of assessment during 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 M.S. 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.)