# Academic Assessment Report

## BEST PRACTICES IN STUDENT LEARNING OUTCOMES
## (B.S. DEGREE / CROP SCIENCE)
## (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 sciences required to perform successfully in private, government, or academic entry-level 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.

**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 discipline specific knowledge required to function as crop 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.
    b. Students will demonstrate the ability to integrate, organize, and effectively present written reports of technical/scientific information.

**Assessment Measure for Outcome 1**

- Achievement is measured using **pre- and post-assessment**.
- This is a ***direct*** measure of student learning.
- Pre- and post-assessment includes 25 test questions from the CPSC faculty covering crop science/physiology, weed science/pest management, crop production, and soil fertility/plant nutrition. These areas represent essential concepts for discipline-specific knowledge of students completing a crop science degree.
- The initial pre- and post-assessment was generated by CPSC faculty during the spring 2016. Target populations are at least half of the (incoming) and half of the fall graduating CPSC class.
- Scores are calculated for each assessment with the range, average, and median calculated for the cohort of pre- or post-assessments. We target calculation of the change in scores from pre- to post-assessment.

**Acceptable** and **Ideal Targets** (<u>not required</u> for indirect measures)

- The use of pre- and post-assessments are a relatively new initiative for CSES; therefore, we remain unsure of how "incoming" students in particular will perform on the pre-assessment.
- Acceptable: We are initially targeting a 50% increase in the mean and/or median test scores between the two populations (incoming and graduating students).
- Ideal: We are initially targeting an 80% increase in the mean and/or median test scores between the two populations (incoming and graduating students).

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

- In 2015-2016, we expected CSES 2103 Crop Science (SP), a required course for all CPSC student, to be the target course for the pre-assessment. We revised this to utilize the CSES recruiter to target incoming CPSC students in 2016-2017. In 2017-2018, incoming CPSC students in the fall were again targeted using the CSES recruiter, while CPSC students enrolled in the CSES 1203 class were administered the pre-assessment in the spring 2018.
- CSES 4013 Advanced Crop Science, a required course for all CPSC students, was moved to spring semester in 2018. Students enrolled in the CSES 4013 class were administered the post-assessment in spring 2019.

**Summary of Findings**

- Pre-assessments were not administered to incoming students during 2018-2019.
- Post-assessment results obtained from five students in the spring 2019 revealed scores from 60 to 88 % with an average of 77 % and a median of 76 %. While the range of scores was narrower than 2017-2018, the average increased slightly from prior averages of 67 and 73 % and median of 76% was similar to the previous academic year, respectively.
- While we do not have a change in scores to report, the post-test scores may be showing a trend towards increasing over time.

**Recommendations**

- Target courses should continue to be CSES 1203 and CSES 4013 for the pre- and post-assessment, respectively. CSES 4013 was moved to spring semester to help with scheduling and should also catch students who are closer to graduating in their final spring semester.
- Another few years of pre- and post-assessment results should allow discussion and determination of appropriate target achievement levels.

**Assessment Measure for Outcome 2**

- Achievement will be measured using a critical thinking scenario (administered during class, potentially included on the post-assessment for learner outcome #1) and assessed using a **critical thinking rubric**.
- This is a ***direct*** measure of student learning.
- Assessment scenarios will be generated to cover application of critical thinking in crop science contexts.

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

- Acceptable: 50% of seniors assessed will score proficient or greater.
- Ideal: 90% of seniors assessed will score proficient or greater.

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

- CSES 4013 Advanced Crop Science, a required course for all CPSC students, is the target course for the assessment.

**Summary of Findings**

- The target class to implement assessment of critical thinking is CSES 4013 Advanced Crop Science which is now a spring course. Faculty continue to contemplate how to best evaluate critical thinking using the assessment rubric within the context of the course.

**Recommendations**

- Crop Science faculty need to resolve how to effectively evaluate critical thinking among CPSC students.

**Assessment Measure for Outcome 3**

- Achievement will be measured using a problem based scenario (administered during class, potentially included on the post-assessment for learner outcome #1) and scored using a **problem solving rubric**.
- This is a ***direct*** measure of student learning.
- Assessment scenarios will be generated to cover application of problem solving in crop science contexts.

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

- Acceptable: 50% of seniors assessed will score proficient or greater.
- Ideal: 90% of seniors assessed will score proficient or greater.

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

- CSES 4013 Advanced Crop Science, a required course for all CPSC students, is the target course for the problem solving assessment.

**Summary of Findings**

- The target class to implement assessment of critical thinking is CSES 4013 Advanced Crop Science which is now a spring course. Faculty continue to contemplate how to best evaluate problem solving using the assessment rubric within the context of the course.

**Recommendations**

- Crop Science faculty need to resolve how to effectively evaluate problem solving among CPSC students.

**Assessment Measure for Outcome 4a**

- Achievement will be assessed using an **oral communication rubric** during oral presentations where the student has compiled and evaluated the scientific literature as part of a class project and/or completed an independent research project as part of a special problems, research project or internship class.
- This is a ***direct*** measure of student learning.

**Acceptable** and **Ideal Targets** (<u>not required</u> for indirect measures).

- Acceptable: 70% of seniors assessed will score proficient or greater.
- Ideal: 90% of seniors assessed will score proficient or greater.

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

- CSES 3023 CSES Colloquium (FA), an upper division, professional development, communication-intensive course that should capture at least capture at least half of the senior population, is the target course for the assessment.
- CSES 462V Internship, Special Problems, and Honors thesis defenses provide opportunities where students present their experiences to an audience and the oral communication rubric can be used to evaluate communication skills.

**Summary of Findings**

- CSES Colloquium is a fall course which is required for CPSC students. Most enroll as seniors, although some students are juniors when they take the course. Four of the students enrolled in the course during the fall 2018 were CPSC students.
- Performance was evaluated during a 10-12-minute presentation that was given by each student as a member of a three-person research team. Teams selected overarching topics and individuals' subtopics to support a single overarching thesis. Students were taught how to work in a team, research and cite evidence, and develop and deliver a presentation to a scientific audience of peers. Scores were assessed for organization, language, delivery, supporting material, and central message. Scores for all criteria ranged from basic to proficient (language) or mastery. The breakdown among students is as follows:

  Organization, Delivery, and Central Message: average and median proficient (3.0) achievement with 75% of students achieving proficiency;

  Language: average and median proficient achievement both score 2.5 mid-range between basic and proficient with only half of the students achieving proficiency;

  Supporting material: basic to proficient achievement with an average of 2.6 and median of 2.3 and only one of the four students achieving proficiency.

**Recommendations**

- Initial assessment from 2016-2017 and 2017-2018 suggested that students have at least a basic level of achievement in oral communication skills with achievement closer to proficient for organization and language, but there remains a need to work on delivery, supporting a thesis, and developing presentations to effectively deliver a central message. This year students fewer than 70% of the sampled students were proficient in effectively using language and supporting material to deliver a scientific speech.

- We will continue to collect data during the next few years to assess performance in oral communication. Supporting and effectively communicating a concise, well supported scientific presentation can be difficult, especially when working with others. However, the development of these skills are critical to functioning in the workforce in the applied sciences. These oral communication skills are skills that employers often complain are lacking in college graduates.

**Assessment Measure for Outcome 4b**

- Achievement will be assessed using a **written communication rubric** for laboratory reports and technical/scientific proposals where the student has analyzed, synthesized and evaluated information from independent sources as part of a class project and/or completed an independent research project as part of a special problems, research project or internship class.
- This is a ***direct*** measure of student learning.

**Acceptable** and **Ideal Targets** (<u>not required</u> for indirect measures).

- Acceptable: 70% of seniors assessed will score proficient or greater.
- Ideal: 90% of seniors assessed will score proficient or greater.

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

- CSES 462V Internship, Special Problems, and Honors thesis research provide opportunities where students have completed independent research projects. Students have to write papers in which they organize data and information they have analyzed, synthesized and evaluated to clearly and fluently convey a message.

**Summary of Findings**

- While an internship or special problem experience is required in the CPSC degree, writing skills were not evaluated during the 2018-2019 year.

**Recommendations**

- Crop Science faculty need to reevaluate an approach that allows for systematic evaluation of written communication skills among graduating CPSC students.

**Overall Recommendations**

- Post-assessment appears to be established, as does assessment for oral communication skills.
- Crop Science faculty need to focus on how to effectively implement assessment of critical thinking, problem solving, and writing skills.
- More data need to be generated during the 2019-2020 academic year before CSES can determine if action is needed to alter assessment, student learner outcomes, and/or curriculum.

**Action Plan**

- Crop Science faculty need to determine how to effectively implement assessment of critical thinking, problem solving, and writing skills.
- The pre-assessment needs to continue being administered to incoming students in CSES 1203, while the post-assessment needs to continue being administered during CSES 4013. Furthermore, oral communication skills should continue to be assessed in CSES 3023.

**Supporting Attachments**

- Pre-/post-assessment for CPSC

- Critical thinking rubric adapted from Association of American Colleges and Universities
- Problem solving rubric adapted from Association of American Colleges and Universities
- Oral communication skills rubric adapted from Association of American Colleges and Universities
- Written communication skills rubric adapted from Association of American Colleges and Universities