Academic Assessment Report

BEST PRACTICES IN STUDENT LEARNING OUTCOMES
(M.S. / CROP, SOIL, and ENVIRONMENTAL SCIENCES)
(MAY 2016)

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** (<u>not required</u> 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.

Summary of Findings

- The development of the CSES Graduate Student Learning Objectives (SLO) Assessment rubric was a new initiative for the CSES Dept. The rubric was adapted by combining items from several Association of American Colleges and Universities (AACU) rubrics into one rubric that encompassed the SLO for the CSES M.S. graduate program. This one rubric will facilitate assessment of SLO during the graduate students' defenses by each student's graduate advisory committee, i.e. the committee working most closely with each student during each person's development and education as a graduate student. The CSES Graduate SLO Assessment rubric was approved by CSES faculty during a faculty meeting in the spring 2016.
- As the rubric is a new initiative, it has not been implemented for use with graduating M.S. students yet. Therefore, we do not have any new data with which to assess the CSES M.S. program.

Recommendations

- The CSES faculty are adjusting to the new practice of implementing student learning outcome assessment at thesis defenses by completing the CSES Graduate SLO Assessment rubric. It will take some time and constant reminders to instill the practice as part of the process during the committee evaluation. However, as program assessment has been a topic at three of four faculty meetings this spring, there has been much discussion about assessment goals, student learner outcomes, and mechanisms to achieve outcomes, which is important to the educational process and to align curriculum to achieve student learner outcomes.

- The use of the CSES Graduate SLO Assessment rubric during defenses has to be implemented in the process of completing thesis defenses such that completing the rubric is a routine practice for advisory committee members.

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** (<u>not required</u> 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.

Summary of Findings

- See Summary of Findings for Outcome 1.

Recommendations

- See Recommendations for Outcome 1.

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** (<u>not required</u> 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.

Summary of Findings

- See Summary of Findings for Outcome 1.

Recommendations

- See Recommendations for Outcome 1.

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** (<u>not required</u> 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.

Summary of Findings

- See Summary of Findings for Outcome 1.

Recommendations

- See Recommendations for Outcome 1.

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** (<u>not required</u> 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.

Summary of Findings

- See Summary of Findings for Outcome 1.

Recommendations

- See Recommendations for Outcome 1.

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** (<u>not required</u> 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.

Summary of Findings

- See Summary of Findings for Outcome 1.

Recommendations

- See Recommendations for Outcome 1.

Overall Recommendations

- At this time, there are no new data to form program 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, without the empirical data, it is difficult to determine if sufficient percentage of the student body is doing so in all stated learning outcomes.
- Thus, at this time, CSES needs to collect data to assess the M.S. program.

Action Plan

- There has been discussion at a CSES faculty meeting to include the CSES Graduate SLO Assessment rubric in the CSES Graduate Student Handbook 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 **<u>must</u>** inform the CSES Dept (i.e. the CSES Dept Head and CSES Office Manager) of a scheduled defense **<u>two weeks prior</u>** 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 Rachael Armstrong in 115 PTSC.

- The CSES Dept needs to collect data from CSES Graduate SLO Assessment rubrics during 2016-2017 in order to compile baseline data of competency levels among 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.)

ORAL COMMUNICATION VALUE RUBRIC

for more information, please contact value@aacu.org

Association of American Colleges and Universities

Definition

Oral communication is a prepared, purposeful presentation designed to increase knowledge, to foster understanding, or to promote change in the listeners' attitudes, values, beliefs, or behaviors.

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone	**Milestones**		**Benchmark**
	Exemplary	Proficient	Basic	Developing
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced, but is not explicitly stated in the presentation.

Crop, Soil, and Environmental Sciences
Oral Communication Performance
Assessment Rubric

Student _____

Degree ESWS CPSC

Course _____

Assignment _____

Date _____

Student Learning Outcomes		**Score using Rubric**
1.	Organization	_____
2.	Language	_____
3.	Delivery	_____
4.	Supporting Material	_____
5.	Central Message	_____

CRITICAL THINKING VALUE RUBRIC

for more information, please contact value@aacu.org

Association of American Colleges and Universities

Definition

Critical thinking is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion, and can be demonstrated in assignments that require students to complete analyses of text, data, or issues..

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone	**Milestones**		**Benchmark**
	Exemplary	Proficient	Basic	Developing
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Crop, Soil, and Environmental Sciences
Undergraduate Student Critical Thinking Performance
Assessment Rubric

Student _____

Degree ESWS CPSC

Course _____

Assignment _____

Date _____

Student Learning Outcomes		**Score using Rubric**
1.	Explanation of issues	_____
2.	Evidence	_____
3.	Influence of context and assumptions	_____
4.	Student's position (perspective, thesis/hypothesis)	_____
5.	Conclusions and related outcomes (implications and consequences)	_____

PROBLEM SOLVING VALUE RUBRIC

for more information, please contact value@aacu.org

Association of American Colleges and Universities

Definition

Problem solving is the **process** of designing, evaluating, and implementing a strategy to answer an open-ended question or achieve a desired goal, involving problems that range from well-defined to ambiguous in a simulated or laboratory context, or in real-world settings..

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone	**Milestones**		**Benchmark**
	Exemplary	Proficient	Basic	Developing
Define Problem	Demonstrates the ability to construct a clear and insightful problem statement with evidence of all relevant contextual factors.	Demonstrates the ability to construct a problem statement with evidence of most relevant contextual factors, and problem statement is adequately detailed.	Begins to demonstrate the ability to construct a problem statement with evidence of most relevant contextual factors, but problem statement is superficial.	Demonstrates a limited ability in identifying a problem statement or related contextual factors.
Identify Strategies	Identifies multiple approaches for solving the problem that apply within a specific context.	Identifies multiple approaches for solving the problem, only some of which apply within a specific context.	Identifies only a single approach for solving the problem that does apply within a specific context.	Identifies one or more approaches for solving the problem that do not apply within a specific context.
Propose Solutions/Hypotheses	Proposes one or more solutions/hypotheses that indicates a deep comprehension of the problem. Solution/hypotheses are sensitive to contextual factors as well as all of the following: ethical, logical, and cultural dimensions of the problem.	Proposes one or more solutions/hypotheses that indicates comprehension of the problem. Solutions/hypotheses are sensitive to contextual factors as well as the one of the following: ethical, logical, or cultural dimensions of the problem.	Proposes one solution/hypothesis that is "off the shelf" rather than individually designed to address the specific contextual factors of the problem.	Proposes a solution/hypothesis that is difficult to evaluate because it is vague or only indirectly addresses the problem statement.
Evaluate Potential Solutions	Evaluation of solutions is deep and elegant (for example, contains thorough and insightful explanation) and includes, deeply and thoroughly, all of the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.	Evaluation of solutions is adequate (for example, contains thorough explanation) and includes the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.	Evaluation of solutions is brief (for example, explanation lacks depth) and includes the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.	Evaluation of solutions is superficial (for example, contains cursory, surface level explanation) and includes the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.
Implement Solution	Implements the solution in a manner that addresses thoroughly and deeply multiple contextual factors of the problem.	Implements the solution in a manner that addresses multiple contextual factors of the problem in a surface manner.	Implements the solution in a manner that addresses the problem statement but ignores relevant contextual factors.	Implements the solution in a manner that does not directly address the problem statement.
Evaluate Outcomes	Reviews results relative to the problem defined with thorough, specific considerations of need for further work.	Reviews results relative to the problem defined with some consideration of need for further work.	Reviews results in terms of the problem defined with little, if any, consideration of need for further work.	Reviews results superficially in terms of the problem defined with no consideration of need for further work

Crop, Soil, and Environmental Sciences
Problem Solving Performance
Assessment Rubric

Student _____

Degree ESWS CPSC

Course _____

Assignment _____

Date _____

Student Learning Outcomes		**Score using Rubric**
1.	Define Problem	_____
2.	Idenitifying Strategies	_____
3.	Propose Solutions/Hypotheses	_____
4.	Evaluate Potential Solutions	_____
5.	Implement Solution	_____
6.	Evaluate Outcomes	_____

Crop, Soil, and Environmental Sciences
Thesis/Dissertation Defense Performance Assessment Rubric

Student Learning Outcomes

To assist with program assessment, in which of the following student learning outcomes did the student demonstrate proficiency? Mark performance on a scale of 1 (not prepared, unskilled) to 4 (advanced, mastery of skill) in each Learning outcome box.

Learning outcome	**4** Advanced/Mastery	**3** Proficient/Adequate	**2** Developing/Beginning	**1** Unprepared/Unskilled
Depth and breadth of discipline related knowledge	Shows higher levels of learning - Clearly explains key concepts and principles; Understands current, relevant literature, and gaps in science; apply concepts to analyze new situations; demonstrates mastery of technical, statistical and/or relevant computer skills	Understands and applies key concepts and principles; Understands current, relevant literature; Collects, summarizes, correctly analyzes data; demonstrates competency of technical, statistical and/or computer skills relevant to discipline	Understands and applies key concepts and principles; some understanding of relevant literature; demonstrates adequate use of some technical, statistical and/or computer skills relevant to discipline	Incomplete and uncomprehensive knowledge of basics principles and ability to apply principle and concepts; demonstrates incomplete or unrefined use of technical, statistical and/or computer skills relevant to discipline
Critical thinking	Clearly and comprehensively states issue/problem. Thoroughly reviews literature and interprets data to evaluate scenarios and create solutions to new problems. Systematically and methodically analyzes own and others' assumptions and carefully evaluates relevance of contexts and limitations of a position. Thesis is imaginative, multidimensional, and conclusions are logical and reflect informed evaluation.	Issue/problem is stated, described, and clarified critically, so that understanding is not seriously impeded by omissions. nterpretation/evaluation is supported with evidence from the literature, but literature and experts are subject to questioning. Identifies own and others' assumptions, relevant contexts when presenting a position. Conclusions are logical and related to outcomes.	Issue/problem is stated critically, but is incompletely defined or explored. Literature review is incomplete, and there is little questioning of experts and assumptions. Acknowledges different sides of an issue. Conclusion is logically tied to information but is unidimensional and related to only some of the outcomes.	Unclear or ill-described issue/problem. Information is collected without interpretation or evaluation. Viewpoints of experts are not questioned. Shows emerging awareness of assumptions. Simple and obvious position. Conclusion is inconsistently tied to some of the information discussed; related outcomes are oversimplified.

Problem solving	Constructs clear and insightful problem statement with evidence of all relevant contextual factors. Proposes one or more hypotheses and tackles problem with multiple approaches. Sensitive to ethical, logical, historical, and cultural dimensions of the problem. Deep and elegant, thorough and insightful, logical explanations. Examines feasibility of solution, and weighs impacts of solution, and considers need for further work.	Constructs a problem statement with adequate detail and evidence of most relevant contextual factors. Identifies multiple approaches for problem solving, some of which apply within a specific context. Comprehends the problem. Sensitive to ethical, logical, historical, and cultural considerations. Evaluation of solutions is adequate, and examines feasibility of solution, weighs impacts of solution, and considers some of the needs for further work.	Superficial problem statement with evidence of most relevant contextual factors. Identifies a single, "off the shelf" approach for solving the problem that does apply within a specific context. Evaluation of solution(s) is brief but includes history of problem, logic/reasoning, solution feasibility, and impacts of solution. Addresses the problem, but ignores relevant contextual factors and need for further work.	Limited ability to define a problem statement, related contextual factors, or specific or relevant solutions Superficial evaluation and/or irrelevant implementation of solutions that does not directly address the problem statement or consideration of need for further work.
Communication skills - oral	Clearly organized, cohesive content. Imaginative, memorable, and compelling. Presentation enhances effectiveness. Delivered at appropriate level. Polished delivery techniques (posture, gesture, eye contact, and vocal expressiveness). Confident speaker. Variety of supporting materials reference information or analysis that significantly supports the presentation or establishes credibility or authority. Central message is compelling (precise, appropriate, memorable, and strongly supported.)	Clear and consistent organization. Thoughtful and effective presentation. Delivered at appropriate level. Quality in delivery techniques (posture, gesture, eye contact, and vocal expressiveness. Supporting materials reference information or analysis that generally supports the presentation or establishes the presenter's credibility. Central message is clear and consistent with the supporting material.	Intermittently observable organizational pattern. Mundane language partially supports the presentation effectiveness. Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable. Supporting materials partially supports the presentation or establishes the presenter's credibility/authority on the topic. Central message is basically understandable.	Organizational pattern is not observable. Unclear language. Presentation is not appropriate to audience. Delivery detracts from the understandability of the presentation, and is uncomfortable. Insufficient supporting materials make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/authority on the topic. Central message can be deduced, but is not explicitly stated in the presentation.

Communication skills - written	Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focused. Appropriate, relevant, and compelling content illustrates mastery of the subject. Detailed attention to and successful execution of organization, content, presentation, formatting, and stylistic choices. Skillful use of high-quality, credible, relevant sources to develop ideas. Clear, fluent, and virtually error-free.	Demonstrates adequate consideration of context, audience, and purpose and a clear focus on the assigned task(s). Appropriate, relevant, and compelling content explores ideas. Organized. Credible, relevant sources to support ideas. Uses straightforward language that generally conveys meaning to readers. Few errors.	Demonstrates awareness of context, audience, purpose, and to the assigned tasks(s). Appropriate and relevant content develops and explores ideas through most of the work. Basic organization. Use of credible and/or relevant sources to support ideas. Generally conveys meaning, although writing may include some errors.	Demonstrates minimal attention to context, audience, purpose, and to the assigned tasks(s). Uses appropriate and relevant content to develop simple ideas in some parts of the work. Attempts to use a consistent system for basic organization and presentation. Attempts to use sources to support ideas in the writing. Language and errors sometimes impede meaning.
Original & Independent Research	Work contributes to advancement of science; adds new contribution to science; student is independent thinker and contributes uniquely to team. Student takes ownership of project and learning by taking initiative and by mastering necessary skills (e.g. conceptual, statistics, laboratory or field skills, etc.) for comprehensive project completion.	Work adds to database of scientific knowledge by confirming or clarifying previous results; student works with minimal guidance. Student is proficient in skills (e.g. conceptual, statistics, laboratory or field skills, etc.) for project completion.	Work adds to database of knowledge but does not advance science; student completes some tasks independently. Student is proficient in some skills (e.g. conceptual, statistics, laboratory or field skills, etc.) necessary for project completion.	Work does not advance science; work need much supervision and review to proceed.

Crop, Soil, and Environmental Sciences

Thesis/Dissertation Defense Performance Assessment Rubric

Defending Graduate Student _____

Major Advisor _____

Degree M.S. Ph.D.

Date of defense _____

Student Learning Outcomes	**Score using CSES Graduate SLO Rubric**
1. Depth & breadth of discipline related knowledge	_____
2. Critical thinking	_____
3. Problem solving	_____
4a. Communication skills – oral	_____
4b. Communication skills – written	_____
5. Original & independent research	_____

Other

Please include any comments you have regarding assessment of this graduate student's achievement towards student learner outcomes, or in assessment of the CSES graduate student program.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

WRITTEN COMMUNICATION VALUE RUBRIC

for more information, please contact value@aacu.org

Association of American Colleges and Universities

Definition

Written communication is the development and expression of ideas in writing. Written communication involves learning to work in many genres and styles. It can involve working with many different writing technologies, and mixing texts, data, and images. Written communication abilities develop through iterative experiences across the curriculum.

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone	**Milestones**		**Benchmark**
	Exemplary	Proficient	Basic	Developing
Context of and Purpose for Writing *Includes considerations of audience, purpose, and the circumstances surrounding the writing task(s).*	Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focuses all elements of the work.	Demonstrates adequate consideration of context, audience, and purpose and a clear focus on the assigned task(s) (e.g., the task aligns with audience, purpose, and context).	Demonstrates awareness of context, audience, purpose, and to the assigned tasks(s) (e.g., begins to show awareness of audience's perceptions and assumptions).	Demonstrates minimal attention to context, audience, purpose, and to the assigned tasks(s) (e.g., expectation of instructor or self as audience).
Content Development	Uses appropriate, relevant, and compelling content to illustrate mastery of the subject, conveying the writer's understanding, and shaping the whole work.	Uses appropriate, relevant, and compelling content to explore ideas within the context of the discipline and shape the whole work.	Uses appropriate and relevant content to develop and explore ideas through most of the work.	Uses appropriate and relevant content to develop simple ideas in some parts of the work.
Genre and Disciplinary Conventions *Formal and informal rules inherent in the expectations for writing in particular forms and/or academic fields (please see glossary).*	Demonstrates detailed attention to and successful execution of a wide range of conventions particular to a specific discipline and/or writing task (s) including organization, content, presentation, formatting, and stylistic choices	Demonstrates consistent use of important conventions particular to a specific discipline and/or writing task(s), including organization, content, presentation, and stylistic choices	Follows expectations appropriate to a specific discipline and/or writing task(s) for basic organization, content, and presentation	Attempts to use a consistent system for basic organization and presentation.
Sources and Evidence	Demonstrates skillful use of high-quality, credible, relevant sources to develop ideas that are appropriate for the discipline and genre of the writing	Demonstrates consistent use of credible, relevant sources to support ideas that are situated within the discipline and genre of the writing.	Demonstrates an attempt to use credible and/or relevant sources to support ideas that are appropriate for the discipline and genre of the writing.	Demonstrates an attempt to use sources to support ideas in the writing.
Control of Syntax and Mechanics	Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error-free.	Uses straightforward language that generally conveys meaning to readers. The language in the portfolio has few errors.	Uses language that generally conveys meaning to readers with clarity, although writing may include some errors.	Uses language that sometimes impedes meaning because of errors in usage.

Crop, Soil, and Environmental Sciences
Written Communication Performance
Assessment Rubric

Student _____

Degree ESWS CPSC

Course _____

Assignment _____

Date _____

Student Learning Outcomes		**Score using Rubric**
1.	Context of and Purpose for Writing	_____
2.	Content Development	_____
3.	Genre and Disciplinary Conventions	_____
4.	Sources and Evidence	_____
5.	Control of Syntax and Mechanics	_____

Environmental, Soil, and Water Science
Pre- and Post- Curriculum Knowledge Assessment

Name_____
Date_____
Semester and Year entered ESWS_____ PRE POST

1. The dissolved oxygen in a BOD sample at 1:20 dilution is initially 11.4 mg liter^{-1}. After 5 days at 20ºC the dissolved oxygen was 3.6 mg liter^{-1}. The BOD_5 of the sample is
   a) 7.8 mg liter^{-1}
   b) 31.2 mg liter^{-1}
   c) 72 mg liter^{-1}
   d) 156 mg liter^{-1}

2. Which of the following is/are true regarding water pollution?
   a) water pollution occurs naturally
   b) water pollution can be accelerated by human activity
   c) water is considered polluted when it is unusable for a particular purpose
   d) all of the above

3. Diversity is
   a) highest at intermediate levels of disturbance
   b) calculated with the following equation $dN/dt = rN (1-N/K)$
   c) the number of different species in a community
   d) calculated with the following equation $N_t = N_o e^{rt}$

4. The H^+ concentration in moles L^{-1} of an aqueous sample with a pH of 6.8 is
   a) 6.8
   b) 6.8×10^5
   c) 1.5845×10^{-7}
   d) $10^{6.8}$

5. Twenty dry tons of poultry litter compost (40% C, C/N = 9) was applied to an acre in March. How much net mineralization would occur in 137 days if its first order rate constant for N mineralization was 0.0001/d?
   a) 0.56 tons
   b) 0.11 tons
   c) 0.54 tons
   d) 12.66 tons

6. Computer-based mapping, analysis, and location-based data management that can be used to solve problems is
   a) Geographic Information System (GIS)
   b) Global Positioning System (GPS)
   c) Raster Imaging
   d) Remote Sensing

7. Which of the following are considered the five soil-forming factors?
   a) climate, relief, time, organisms, and plants
   b) color, relief, time, organisms, and rocks
   c) country, topography, temperature, animals, and rocks
   d) parent material, relief, time, organisms, and climate

8. The fine-earth fraction of soil has what upper-limit of physical dimension?
   a) 2 microns
   b) 2 mm
   c) 0.2 mm
   d) 0.02 m

9. What precursor air pollutants emitted from industrial and mobile sources result in ozone formation
   a) VOC and NO_x
   b) NO_x and SO_x
   c) CO_2 and H_2O
   d) CO and NO_x

10. Which of the following is not an ecological consequence of acid deposition?
   a) decreased aquatic diversity and increased risk of harmful algal blooms
   b) eutrophication
   c) leaching of basic cations from soil and aluminum toxicity to plants
   d) weathering from acid inputs that increases buffering capacity of soils

11. The problem that we currently face in global climate change is not that the earth has never been so warm, but the rapid changes in climate. Current models estimate that the average global temperature may rise between 2 and 6^{o}C during the next century leading to which of the following consequences?
   a) a consistent increase in temperature across the globe
   b) inconsistent rates of change across species and locations altering ecology
   c) rapid adaptation of plants and animals to new phenology and abiotic conditions
   d) warmer climatic with unchanged precipitation patterns

12. Which of the following soil microorganisms are generally most numerous in a typical agricultural soil?
   a) bacteria
   b) fungi
   c) nematodes
   d) protozoa

13. Sulfate is extracted in 50 mL extract solution from 22 g of moist soil, reacted chemically to form a precipitate, and absorbance of light in the solution is measured in a spectrophotometer. The dry weight of a 10-g soil sample at equivalent moisture content was 8.1 g. The calibration curve for absorbance data based on standard solutions is shown below. The regression of the calibration curve gave an $R^2 = 0.997$, with a slope = 0.018, and the y-intercept = 0.002.

Std. (µg S/mL)	abs
0	0.002
12.5	0.205
25	0.478
50	0.883

The extraction solution absorbance of the soil sample is 0.381. Given these data, what is the concentration of SO_4^{-2}-S (µg S/g) in the soil?

a) 0.06
b) 2.6
c) 21.1
d) 58.8

14. During an analysis for soil test phosphorus of Mehlich-III soil extract analyzed by inductively coupled plasma- atomic emission spectroscopy, the laboratory technician extracts and analyzes a laboratory duplicate to check the precision of the method. This is an example of

a) quality assurance
b) quality control
c) field duplicate
d) MDL

15. Ammonium sulfate $(NH_4)_2SO_4$ is broadcast onto to a silty clay soil which is at a temperature of 25 ^oC and a moisture content of 0.3 g g^{-1}. What would be the immediate loss mechanism of concern for N?

a) denitrification
b) nitrification
c) volatilization
d) leaching

16. Estimate the CEC of a Mollisol at pH = 7, with 16% 2:1 smectite clay (average CEC of 80 $cmol_c$/kg), 3% kaolinite clay (average CEC of 8 $cmol_c$/kg), and 3.5% OM (average CEC of 200 $cmol_c$/kg).

a) 288
b) 35.83
c) 22.5
d) 20.04

17. A soil core 10 cm long and 2.5 cm in diameter is collected from a moist field. The moist soil weight in the core is 132 g. The empty core weight is 35 g. The dry soil weight is 78 g. What is the volumetric moisture content of the soil?
    a) 0.20
    b) 0.24
    c) 0.30
    d) 0.41

18. Stream A supplies Town X's drinking water. Should one be concerned about the quality of Town X's drinking water?

nitrate	5 ppm
phosphate	10 ppb
oxygen	8.5 ppm
E. coli	25/100 mL

    a) fecal contamination and possible presence of pathogens
    b) excessive nitrate
    c) excessive phosphate
    d) low dissolved oxygen

19. Which of the following best describes the three key characteristics of a wetland?
    a) hydrophobic vegetation, hydrology, and organic soil
    b) hydrophobic vegetation, continuous ponded water, and hydric soil
    c) hydrophilic vegetation, continuous ponded water, and hydric soil
    d) hydrophytes, hydrology, and hydric soil

20. Which of the following water characteristics represents a eutrophic lake?
    a) low dissolved P concentration
    b) low light absorbance reading
    c) long Secchi disk reading
    d) low chlorophyll-a reading