Institutional Effectiveness
2023-2024

Program: Environmental and Sustainability Studies BS
College and Department: College of Interdisciplinary Studies, School of Environmental Studies
Contact: Steve Sharp
Mission:

The School of Environmental Studies will foster in students the desire to lead purposeful professional lives through the application of scientific principles to environmental issues within the social, political, and economic framework of our society.

Attach Curriculum Map (Educational Programs Only):
Concentrations and Options: As of Fall 2023, the B.S. degree program in Environmental and Sustainability Studies (ESS) has seven concentrations. These are listed below:

1. Environmental Science
2. Environmental Science - Biology
3. Environmental Science - Chemistry
4. Environmental Leadership, Communication and Policy
5. Environmental Sustainability
6. Environmental Technology
7. Natural Resources

Previously, there were three concentrations. Two of the three concentrations had additional curricular options nested within them as summarized below:

Concentration 1. Environmental Science

Option 1.1. Biology

Option 1.2. Chemistry

Option 1.3. Natural Resources

Concentration 2. Society, Culture and Communication

Option 2.1. Communication and Media

Option 2.2. Social Science and Policy

Option 2.3. Leadership and Environmental Management

Concentration 3. Environmental Technology

Attached Files: See Appendix 1

SLO 1: Effective Communication of Scientific Information

Define Outcome:
SLO 1: Students will communicate scientific information effectively in writing, orally, and visually.

Assessment Methods:

1. *IDEA Student Evaluation Results (indirect measure)*: IDEA evaluations are administered for each course in the curriculum. Students rate their learning progress in oral and written communication by responding to the learning objective prompt, "Developing skill in expressing myself orally or in writing," using a 5-point scale: 1 - No apparent progress, 2 - Slight progress, 3 - Moderate progress, 4 - Substantial progress, 5 - Exceptional progress.
2. *Rubrics for Senior Capstone Course (direct measure):* The rubric shown in Appendix 1 generates a score on a 4-pt scale that can be converted to an index ranging from 0 to 100 that can be tracked from year-to-year to provide a quantitative assessment of program quality as reflected by the quality of student team proposals and projects. Another rubric (Appendix 2) was developed in 2019 to evaluate the capstone presentation that is given in the second semester (spring semester) of the two-semester capstone sequence.
   In order to also evaluate individual research and communication skills, the instructors began in fall 2020 having each student write a literature review and present their findings to the class. In fall 2021, they developed a rubric for evaluating these presentations. The full rubric can be found in Appendix 3.
3. *Senior Exit Survey (indirect measure):* Each graduating senior will complete a departmental exit survey. The survey has 31 questions to rate the quality of program components from the student's perspective on a scale from 1 to 4, reflecting 1 (poor), 2 (fair), 3 (good) and 4 (excellent).

Attached Files: See Appendix 2

Criteria for Success (Thresholds for Assessment Methods):

1. *IDEA Student Evaluation Results (indirect measure)*: There are two criteria of success for this indirect measure: 1) The average rating of progress in "developing skill in expressing myself orally or in writing," is at the 3.0 level or higher for each ESS course, indicating students overall felt they made modest progress or better on this objective in each class. 2) The overall average for all courses for this SLO is at 4.0 or more. This would indicate that overall, the student perception was that they made substantial progress or better on these objectives in ESS courses. These criteria for success were established in discussion with SOES faculty.

2. *Rubrics for Senior Capstone Course (direct measure):* Two criteria of success include 1) an overall average score on each rubric at 80% or higher (3.2/4.0 scale), indicating an acceptable level of competence on the criteria measured, and 2) the average student score on each rubric criterion is at 3.0 or greater indicating acceptable performance.
3. *Senior Exit Survey (indirect measure):* The criterion for success on this objective is an average score of 3.0 or greater on this 4.0 scale, indicating graduating seniors felt they had made good to excellent progress on this objective. This criterion for success was established in discussion with SOES faculty. Also, as an additional measure, we will begin looking at the percentage of graduating seniors who respond good or excellent, with a criterion of success as 90% having stated they made either good or excellent progress on this objective.

Link to 'Tech Tomorrow' Strategic Plan:

1.A Experiential Learning,1.D High Impact Practices,2.B Research, Scholar, Intellect, and Creativity

Results and Analysis:

i. IDEA Student Evaluation Results

IDEA results were analyzed for undergraduate ESS courses taught during 2023-2024. Results from the previous four academic years are also shown for comparison (Table 1). The average score for student perception of oral and written skill development in ESS courses taught during the 2023-24 academic year was 4.0 out of a possible score of 5. Of the nine ESS courses offered, six were at or above the 4.0 score, indicating student perception of "substantial progress."

Table 1. Student-rated progress on IDEA Objectives related to student learning outcomes for ESS courses taught during the most recent four academic years.

	IDEA Objectives				
	Developing skills in expressing myself orally or in writing				
Course	'20	'21	'22	'23	**'24**
ESS 1020	5.0	4.3	4.0	----	**----3.7**
ESS 1100	3.5	3.8	3.9	3.6	
ESS 2100	--	--	5.0	3.9	**4.2**
ESS 3000	4.3	2.9	4.5	3.2	**4.0**
ESS 3710	3.4	3.1	3.3	3.0	**3.1**

ESS 3100	--	--	5.0	4.3	**4.1**
ESS 3200	--	--	--	4.3	**----**
ESS 4001	5.0	4.0	4.0	3.6	**3.9**
ESS 4002	4.9	4.3	3.6	2.2	**4.5**
ESS 4100	--	--	4.0	3.9	**4.1**
ESS 4110	--	4.4	--	3.6	**4.7**
Average Score	4.4	4.0	4.1	3.6	**4.0**

ii. Rubrics for Senior Capstone Course

Beginning in 2021-22, Each student wrote a literature review focused on some aspect of the client project and then presented it via PowerPoint. Instructors evaluated these literature review papers, PowerPoint slides and presentations to better assess individual communication skills. The instructors used the Rubric for a Research Presentation to assess each presentation. The summary of the 2023-24 scores is included in Table 2 below, alongside scores from 2021-22 and 2022-23.

Table 2: Rubric Summary for Individual Literature Reviews and Presentations

Rubric Category	2021-22 n=21	2022-23 n=15	**2023-24 n=13**
PowerPoint Slides	3.4	3.3	**3.5**
Oral Presentation	3.5	3.6	**3.5**
Literature Sources	3.8	3.4	**4.0**
Grammar Usage	3.7	3.3	**3.6**
Timing	3.6	3.1	**3.7**
Total Score	18/20	16.7/20	**18.3/20**
Percent Score	90%	84%	**92%**

Students overall did very well finding a variety of sources for their literature reviews and putting together informative and visually appealing slides. Overall, their presentations were quite good. The only category that did not improve was the actual oral presentation and it stayed about the same, but at an acceptable level.

The capstone instructors developed a new rubric for evaluation of the final presentation in ESS 4002 (Team Project Oral Presentation) that was first implemented in the 2018-2019 academic year. Students continued to do well on the final team presentation. In Spring 2024, students scored an average 97% on the rubric indicators (Table 3), as compared with 94% for Spring 2023, 93% for Spring 2021, 96% for Spring 2020 and 93% for Spring 2019. (For Spring 2022, the students did not do a formal presentation to the clients.)

Table 3: Rubric for Research Project Presentation

	Power Point Presentation	Oral Presentation	English Grammar	Questions	Professional Appearance	Organization	Numeric Score	**Percent Score**
Spring 2021	3.75	3.75	3.75	4.0	4.0	3.75	23.0/24	**96%**
Spring 2023	3.75	3.75	4.0	3.25	4.0	3.75	22.5/24	**94%**
Spring 2024	3.8	3.9	4.0	3.75	4.0	3.8	23.25/24	**97%**

iii. Senior Exit Survey

Twelve graduating seniors completed exit surveys in 2023-2024, with results shown in Table 4. This cohort of students represented the ninth graduating group of seniors in the ESS degree program. Students rated the quality of the ESS program (1 = poor; 2 = fair; 3 = good; 4 = excellent) for questions related to developing their communication skills, interdisciplinary teamwork, and environmental problem solving.

The Senior Exit Survey indicates two primary things related to SLO 1: *Students will communicate scientific information effectively in writing, orally, and visually.*

- First, most students felt they had made good to excellent progress in using scientific literature (3.5/4.0), which is a prerequisite to being able to communicate scientific information.
- Second, students felt similarly about their progress in communicating scientific information (3.1/4.0), although it was significantly lower. In fact, it was the lowest of any recent years. This is an area to be addressed.

Additionally, for the first time we wanted to consider the percentage of seniors who believed they had made either good or excellent progress on these particular objectives.

- For the question regarding progress on "learning to use the scientific literature," 36% felt they had made good progress and 55% felt they made excellent progress, for a combined percentage of 91%.
- For the question regarding progress on "learning to effectively communicate scientific information," 42% felt they had made good progress and 42% felt they made excellent progress, for a combined percentage of 84%. This is below the established criterion for success of 90%. As mentioned above, improvement of communication skills, or at least student perception of improvement of communication skills, needs to be addressed.

Table 4. Average scores from ESS senior exit survey results for four survey questions related to student learning outcomes.

Survey Question	Associated Learning Outcome	Academic Year						
		2017-18 (*n*= 14)	2018-19 (*n*= 9)	2019-20 (*n*= 5)	2020-21 (*n*= 5)	2021-22 (*n* = 5)	2022-23 (n=12)	**2023-24 (n=12)**
Use of scientific literature	SLO 1: Communication skills	3.6	3.9	3.6	4.0	3.4	3.5	**3.5**
Communicating scientific information	SLO 1: Communication skills	3.6	3.7	3.6	3.4	3.2	3.8	**3.1**

Sample sizes are shown for each academic year (*n* = number of students who completed the senior exit survey).

Use of Results to Improve Outcomes:

1. IDEA Evaluations: Student rating of the IDEA objective "developing skill in expressing myself orally and in writing" continued to be strong. Faculty have continued to emphasize this in most of the ESS courses. ESS 3000 Introduction to Environmental Law and ESS 3710 Chemistry and the Environment are exceptions, with scores hovering just above 3.0. Discussion with faculty can help determine if the SLO is not appropriate for those two courses or if instruction and exercises can be introduced to bolster these communication skills.
2. Rubric for Senior Capstone Course: The capstone instructors developed a new rubric for evaluation of the final presentation in ESS 4002 (Team Project Oral Presentation) that was first implemented in the 2018-2019 academic year. Students continued to do well on the final team presentation. In Spring 2024, students scored an average 97%

on the rubric indicators (Table 3), as compared with 94% for Spring 2023, 93% for Spring 2021, 96% for Spring 2020 and 93% for Spring 2019. (For Spring 2022, the students did not do a formal presentation to the clients.)

3. Senior Exit Survey: For the question regarding progress on "learning to effectively communicate scientific information," 42% felt they had made good progress and 42% felt they made excellent progress, for a combined percentage of 84%. This is below the established criterion for success of 90%. As mentioned above, improvement of communication skills, or at least student perception of improvement of communication skills, needs to be addressed.

SLO 2: Ability to Work Collaboratively

Define Outcome:
SLO 2: Students will demonstrate the ability to work collaboratively on interdisciplinary teams.

Assessment Methods:

1. *IDEA Student Evaluation Results (indirect measure)*: IDEA evaluations are administered for each course in the curriculum. Students rate their learning progress in interdisciplinary teamwork by responding to the learning objective prompt, "Acquiring skills in working with others as a member of a team," using a 5-point scale: 1 – No apparent progress, 2 - Slight progress, 3 - Moderate progress, 4 - Substantial progress, 5 - Exceptional progress.
2. *Rubrics for Senior Capstone Course (direct measure):* The rubric shown in Appendix 1 generates a score on a 4-pt scale that can be converted to an index ranging from 0 to 100 that can be tracked from year-to-year to provide a quantitative assessment of program quality as reflected by the quality of student team proposals and projects. Another rubric (Appendix 2) was developed in 2019 to evaluate the capstone presentation that is given in the second semester (spring semester) of the two-semester capstone sequence.
   In order to also evaluate individual research and communication skills, the instructors began in fall 2020 having each student write a literature review and present their findings to the class. In fall 2021, they developed a rubric for evaluating these presentations. The full rubric can be found in Appendix 3.
3. *Senior Exit Survey (indirect measure):* Each graduating senior will complete a departmental exit survey. The survey has 31 questions to rate the quality of program components from the student's perspective on a scale from 1 to 4, reflecting 1 (poor), 2 (fair), 3 (good) and 4 (excellent). The specific question prompt used to assess student perception for this SLO is "Progress you made in working collaboratively on an interdisciplinary capstone team."

Criteria for Success (Thresholds for Assessment Methods):

1. *IDEA Student Evaluation Results (indirect measure)*: There are two criteria of success for this indirect measure: 1) The average rating of progress in "acquiring skills in working with others as a member of a team," is at the 3.0 level or higher for each ESS course, indicating students overall felt they made modest progress or better on this objective in each class.2) The overall

average for all courses for this SLO is at 4.0 or more. This would indicate that, overall, there was a student self-perception of substantial progress on these objectives in ESS courses. These criteria for success were established in discussion with SOES faculty.

1. *Capstone Course (direct measure):* Two criteria of success include 1) an overall average score on each rubric at 80% or higher (3.2/4.0 scale), indicating an acceptable level of competence on the criteria measured, and 2) the average student score on each rubric criterion is at 3.0 or greater indicating acceptable performance. These criteria for success were established in discussion with SOES faculty.
2. *Senior Exit Survey (indirect measure):* The criterion for success on this objective is an average score of 3.0 or greater on this 4.0 scale, indicating graduating seniors felt they had made good to excellent progress on this objective. This criterion for success was established in discussion with SOES faculty. Also, as an additional measure, we will begin looking at the percentage of graduating seniors who respond good or excellent, with a criterion of success as 90% having stated they made either good or excellent progress on this objective.

Link to 'Tech Tomorrow' Strategic Plan:
1.A Experiential Learning,1.D High Impact Practices,2.B Research, Scholar, Intellect, and Creativity,4.A Sustainable Partnerships

Results and Analysis:
i. IDEA Student Evaluation Results
IDEA results were analyzed for undergraduate ESS courses taught during 2023-2024. Results from the previous four academic years are also shown for comparison (Table 5). In 2023-2024, average scores for student perception of progress on teamwork, as well as oral and written communication, were back up above the 4.0 mark.

One of the primary issues in looking at this measure across the board for ESS courses is that some of the instructors do not incorporate team activities into their curriculum (ESS 1100 online, ESS 2100, ESS 3000, etc.); therefore, one would not expect the measure to be high in these courses.

One of the more encouraging things to note is the dramatic improvement in the student ratings in the capstone course from Spring 2023 (ESS 4002 – 4.1/5.0) and Fall 2023 (ESS 4001 – 3.8/5.0) to Spring 2024 (ESS 4002 – 4.6/5.0). This was very encouraging. Capstone faculty members recognized the precipitous drop over the

past year and worked diligently to successfully address the student concerns.

Table 5. Student-rated progress on IDEA Objectives related to student learning outcomes for ESS courses taught during the most recent five academic years.

	IDEA Objectives				
	Acquiring skills in working with others as a member of a team				
Course	'20	'21	'22	'23	**'24**
ESS 1100	4.2	4.0	4.2	3.9	**4.1**
ESS 2100	--	--	3.0	3.3	**4.1**
ESS 3000	4.5	1.9	4.9	3.0	**3.9**
ESS 3710	3.0	1.7	2.4	2.4	**3.8**
ESS 3100	--	--	4.7	4.0	**4.7**
ESS 3200	--	--	--	3.5	**----**
ESS 4001	5.0	4.2	4.4	4.1	**3.8**
ESS 4002	5.0	4.6	4.5	3.0	**4.6**
ESS 4100	--	--	2.5	3.1	**4.3**
ESS 4110	--	3.4	--	3.5	**4.6**
Average Score	4.5	3.6	4.0	3.4	**4.2**

ii. Rubrics for Senior Capstone Course

In the capstone sequence, the first course (ESS 4001) entails exploration of a real-world environmental or sustainability issue offered by a cooperating organization or agency, while the second course (ESS 4002) involves producing a formal proposal for solving the issue and in some cases implementing a portion of the project.

The capstone instructors developed a new rubric for evaluation of the final presentation in ESS 4002 (Appendix 2) that was first implemented in the 2018-2019 academic year. The students in Spring 2024 scored 23.25 out of 24 (97% - Table 3) on their capstone presentation, as compared with 94% in Spring 2023, 96% in 2021 (adjusted score from previous reporting to reflect dropping the "budget" category from the rubric), 96% in 2020 and 93% in 2019. (Note: For spring 2022, the students did not do a formal presentation to the clients. Instead, they presented a final white paper to the clients regarding carbon neutrality efforts at the Bridgestone property. They also planned and conducted a workshop for small forest landowners on the

Upper Cumberland.)

iii. Senior Exit Survey

Twelve graduating seniors completed exit surveys in 2023-2024, with results shown in Table 6. This cohort of students represented the ninth graduating group of seniors in the ESS degree program. Students rated the quality of the ESS program (1 = poor; 2 = fair; 3 = good; 4 = excellent). Results for the 2023-24 senior exit survey show that overall students felt they had made good to excellent progress in "working collaboratively on an interdisciplinary team," with an average rating of 3.5.

Additionally, for the first time we wanted to consider the percentage of seniors who believed they had made either good or excellent progress on this particular objective. Approximately 36% of seniors felt they had made good progress and 55% excellent progress, for a combined total of 91%. This means that 9 of 10 graduating seniors believed they had made good to excellent progress on working in collaborative teams. This is encouraging.

Table 6. Average scores from ESS senior exit survey results for four survey questions related to student learning outcomes.

Survey Question	Associated Learning Outcome	Academic Year						
		2017-18 (*n*= 14)	2018-19 (*n*= 9)	2019-20 (*n*= 5)	2020-21 (*n*= 5)	2021-22 (*n* =5)	2022-23 (n=12)	**2023-24 (n=12)**
Collaborative capstone teamwork	Interdisciplinary teamwork	3.5	3.8	3.8	4.0	3.0	3.6	**3.5**

(*n* = number of students who completed the senior exit survey)

Use of Results to Improve Outcomes:

IDEA Evaluations: One of the primary issues in looking at this measure across the board for ESS courses is that some of the instructors do not incorporate team activities into their curriculum (ESS 1100 online, ESS 2100, ESS3000, etc.); therefore, one would not expect the measure to be high in these courses. Consideration will need to be given as to whether to incorporate collaborative work into these courses or to exclude them from evaluation of this particular objective, recognizing that significant team-based learning may not be necessary in all ESS courses in order for students to learn effective teamwork skills within the ESS program.

SLO 3: Ability to Integrate Knowledge

Define Outcome:

SLO 3: Students will demonstrate the ability to integrate social, economic, biological, chemical, and physical science knowledge to identify, formulate, and solve environmental problems.

Assessment Methods:

1. ***IDEA student evaluation results*** *(indirect measure)*: IDEA evaluations are administered for each course in the curriculum. Students rate their learning progress in critical thinking skills by responding to the learning objective prompt, "Learning to analyze and critically evaluate ideas, arguments and points of view," using a 5-point scale: 1 - No apparent progress, 2 - Slight progress, 3 - Moderate progress, 4 - Substantial progress, 5 - Exceptional progress.
2. ***Rubrics for senior capstone course*** *(direct measure):* The rubric shown in Appendix 1 generates a score on a 4-pt scale that can be converted to an index ranging from 0 to 100 that can be tracked from year-to-year to provide a quantitative assessment of program quality as reflected by the quality of student team proposals and projects. Another rubric (Appendix 2) was developed in 2019 to evaluate the capstone presentation that is given in the second semester (spring semester) of the two-semester capstone sequence.
   In order to also evaluate individual research and communication skills, the instructors began in fall 2020 having each student write a literature review and present their findings to the class. In fall 2021, they developed a rubric for evaluating these presentations. The full rubric can be found in Appendix 3.
3. ***Senior exit survey*** *(indirect measure):* Each graduating senior completes a departmental exit survey. The survey has 31 questions to rate the quality of program components from the student's perspective on a scale from 1 to 4, reflecting 1 (poor), 2 (fair), 3 (good) and 4 (excellent). The specific question prompt used to assess student perception for this SLO is "Progress you made in learning to think critically and analyze ESS problems." Additionally, we will for the first time consider the student responses regarding the progress they made "learning to think critically and analyze ESS problems."
4. ***Major Field Exam*** *(direct measure):* Beginning with the 2020-2021 academic year, a major field exam was administered to graduating seniors. Since there is, as of yet, no national exam that fits our curriculum, we developed an exam tailored to our program. In developing the major field

exam, we solicited questions from the instructors of the core courses all our majors must take. In formulating this assessment, we focus on students' knowledge of key concepts selected from the core courses. We asked core course faculty to submit 10-15 questions that would address the most essential elements of their course. Additionally, we have incorporated questions to assess student competence related to our three SLOs. The core course sections demonstrate knowledge of "social, economic, biological, chemical, and physical science." The additional questions focus on knowledge of communication, teamwork, and application of knowledge.

Criteria for Success (Thresholds for Assessment Methods):

1. *IDEA Student Evaluation Results (indirect measure)*: There are two criteria of success for this indirect measure: 1) The average rating of progress in "learning to analyze and critically evaluate ideas, arguments, and points of view," is at the 3.0 level or higher for each ESS course is at the 3.0 level or higher for each ESS course, indicating students overall felt they made modest progress or better on this objective in each class.2) The overall average for all ESS courses for this SLO is at 4.0 or more. This would indicate that overall, there was a student self-perception of substantial progress on these objectives in ESS courses. These criteria for success were established in discussion with SOES faculty.
2. *Rubrics for Senior Capstone Course (direct measure):* Two criteria of success include 1) an overall average score on each rubric at 80% or higher (3.2/4.0 scale), indicating an acceptable level of competence on the criteria measured, and 2) the average student score on each rubric criterion is at 3.0 or greater indicating acceptable performance. These criteria for success were established in discussion with SOES faculty.
3. *3. Senior Exit Survey (indirect measure):* The criterion for success on this objective is an average score of 3.0 or greater on this 4.0 scale, indicating graduating seniors felt they had made good to excellent progress on this objective. This criterion for success was established in discussion with SOES faculty. Also, as an additional measure, we will begin looking at the percentage of graduating seniors who respond good or excellent, with a criterion of success as 90% having stated they made either good or excellent progress on this objective.
4. *Major Field Exam Results (direct measure):* The criteria for success would be an overall average score of 70 or better. This criterion was established in discussion with SOES faculty.

Link to 'Tech Tomorrow' Strategic Plan:

1.A Experiential Learning,1.D High Impact Practices,2.B Research, Scholar, Intellect, and Creativity,3.A Efficiency and Effectiveness,4.A Sustainable

Partnerships

Results and Analysis:

i. IDEA Student Evaluation Results

IDEA results were analyzed for undergraduate ESS courses taught during 2023- 2024.Results from the previous four academic years are also shown for comparison (Table 7).The overall average student perception of progress on the IDEA statement, "Learning to analyze and critically evaluate ideas, arguments, and viewpoints" was a 4.2, indicating that overall students feel they have made substantial progress in this measure.

Table 7. Student-rated progress on IDEA Objective related to SLO 3 for ESS courses taught during the most recent five academic years.

	IDEA Objectives				
	Learning to analyze and critically evaluate ideas, arguments, and viewpoints				
Course	20	21	22	23	**24**
ESS 1020	5.0	3.8	4.0	--	**--**
ESS 1100	4.1	4.4	4.3	3.9	**4.1**
ESS 1100 (online)	--	--	--	4.5	**4.1**
ESS 2100	--	--	4.5	4.2	**4.7**
ESS 3000	4.8	3.3	4.8	4.1	**4.2**
ESS 3710	3.6	3.0	3.5	3.1	**3.3**
ESS 3100	--	--	5.0	4.8	**4.4**
ESS 3200	--	--	--	4.5	**----**
ESS 4001	5.0	3.8	3.8	3.7	**3.7**
ESS 4002	4.9	4.3	3.6	2.4	**4.7**
ESS 4100	--	--	3.8	**4.1**	**4.3**
ESS 4110	--	4.8	--	**4.3**	**4.6**
Average Score	4.6	4.1	4.1	**4.0**	**4.2**

ii. Rubrics for Senior Capstone Course

In Spring Semester 2024, capstone students scored a 23.25 out of 24 (97%) on their capstone presentation, as compared with 94% in Spring 2023, 96% in 2021, 96% in 2020 and 93% in 2019.While this measure is primarily focused on the final presentation (communication skills), the score also indicates that, as a whole, students understood the process and demonstrated the "ability to integrate social, economic, biological, chemical, and physical science knowledge to identify,

formulate, and solve environmental problems."

Rubric for Research Project Presentation

	Power Point Presentation	Oral Presentation	English Grammar	Questions	Professional Appearance	Organization	Numeric Score	**Percent Score**
Spring 2021	3.75	3.75	3.75	4.0	4.0	3.75	23.0/24	**96%**
Spring 2023	3.75	3.75	4.0	3.25	4.0	3.75	22.5/24	**94%**
Spring 2024	3.8	3.9	4.0	3.75	4.0	3.8	23.25/24	**97%**

ii. Senior Exit Survey

Twelve graduating seniors completed exit surveys in 2023-2024, with results shown in Table 8. This cohort of students represented the ninth graduating group of seniors in the ESS degree program. Students rated the quality of the ESS program (1 = poor; 2 = fair; 3 = good; 4 = excellent) for questions related to developing their communication skills, interdisciplinary teamwork, and environmental problem solving. The perception by graduating seniors of the progress they made "integrating interdisciplinary knowledge to solve environmental problems" was 3.5 out of a 4.0 scale. This indicates that students overall felt they had made good to excellent progress "integrating interdisciplinary knowledge to solve environmental problems." In a new measure, the average student response regarding progress on learning to "think critically and analyze ESS problems," was a 3.6, slightly higher than the response regarding solving environmental problems.

Additionally, for the first time we wanted to consider the percentage of seniors who believed they had made either good or excellent progress on these particular objectives.

- For the question regarding progress on "integrating interdisciplinary knowledge to solve environmental problems," 17% felt they had made good progress and 67% felt they made excellent progress, for a combined percentage of 84%.
- For the question regarding progress on "learning to think critically and analyze ESS problems," 25% felt they had made good progress and 67% felt they made excellent progress, for a combined percentage of 92%.

In more concrete terms, this means one student believed they had made only fair progress on analyzing environmental problems, yet two students felt they had made only fair progress on solving environmental problems. No students felt they had made poor progress.

Table 8. Average scores from ESS senior exit survey results for four survey questions related to student learning outcomes.

Survey Question	Associated Learning Outcome	Academic Year					
		2018-19 (*n*= 9)	2019-20 (*n*= 5)	2020-21 (*n*= 5)	2021-22 (*n* = 5)	2022-23 (n=12)	**2023-24 (n=12)**
Integrating interdisciplinary knowledge to solve environmental problems	SLO 3: Environmental problem solving	3.9	3.8	3.4	3.4	3.6	**3.5**
Think critically and analyze ESS problems	SLO 3: Environmental problem solving	----------	----------	----------	----------	----------	**3.6**

Sample sizes (*n* = number of students who completed the senior exit survey) are shown for each academic year.

iii. Major Field Exam Results

During the spring of 2021, we administered a pilot of the ESS Major Field Exam. Students were informed that the exam would consist of 50 multiple-choice questions, would come from the core courses, and would focus on the core concepts from those courses, but were given no other information or study guides. This is currently a paper- pencil exam but we are working on converting it to a computer-based exam. For the pilot administration of the exam (2020-21), students answered approximately two of every three questions correctly (66%), with a range of 48% to 76% correct. For the 2021-22 administration, the student average was 61% with a range of 50% to 76%. The range of scores by core course or section were from a low of 43% to a high of 83% for 2020-21 and 39% to 87% for 2021-22. For the 2022-23 administration, the student average was 65% with a range of 40% to 82%. The range of scores by core course or section were from a low of 43% to a high of 83% for 2020-21, 39% to 87% for 2021-22, and 45% to 86% for 2022-23.

In 2023-24, the average score for all sections of the exam was 64% with a range of

section scores from 44% to 84%. The range of students' exam scores were from 40% to a high student score of 82%. See Table 9.

Table 9: Summary of Major Field Exam Scores

ESS Major Field Exam Summary Percent Correct

	Core Courses/Exam Sections	2020-21	2021-22	2022-23	2023-24
1	Introduction to Environmental Studies	71	60	73	84
2	Earth, Environment, Resources and Society	71	43	46	47
3	Statistical Methods	54	45	45	51
4	General Ecology	66	68	70	83
5	Chemistry and the Environment	43	39	55	48
6	Environmental Law	74	57	75	60
7	Environmental Sociology	83	87	80	84
8	Environmental History	57	44	58	44
9	Natural Resource Economics	57	60	58	56
10	ESS Broad Student Learning Objectives	80	68	86	82
	Average Score on all Sections	66	57	65	**64**
	Range of Total Scores by Students	48-76	50-76	40-82	**42-80**

Use of Results to Improve Outcomes:

As a whole, the indicators show that students perceive they are doing well and are doing well in learning to integrate and apply the knowledge they have acquired. Over the past few years, we have been engaged in the process of revamping our curriculum, specifically with the addition of new courses and a restructuring of our concentrations. We have modified some concentrations and created a completely new concentration to better meet current and expected professional demand and to provide students with more in-depth understanding of current environmental and sustainability issues and initiatives.

Summative Evaluation:

SOES faculty and staff continue to work together to evaluate and improve the ESS program in order to meet the current and future needs of ESS majors, future employers, and society as a whole. Our plan:

1) A relatively few ESS courses consistently score lower on SLOs related to oral and written communication and teamwork. Faculty discussion, deliberation and action is needed in order to continue improvement, meeting criteria of success and raising the bar. Possible actions could include:
    a. incorporating new and/or improved oral and written communication and teamwork exercises where they are lacking or absent,
    b. eliminating specific courses from evaluation for those SLOs if it is determined that the other courses address the SLOs sufficiently, or
    c. reconsidering the value of the current SLOs and changing them where appropriate
2) Develop a rubric to measure individual writing skills of students on the literature review in the capstone courses. This specific, individual assessment is missing.
3) Discuss Major Field Exam test questions and results with statistics faculty to bolster student understanding and retention of statistical principles. Revamp the exam to include newly added ESS courses to the curriculum.
4) Present to students fresh, new capstone projects to work on each year.

List of Appendices:

Appendix 1: Environmental & Sustainability Studies BS Curriculum Map

Appendix 2: SLO1 Assessment Methods

Appendix 1: Environmental & Sustainability Studies BS Curriculum Map

B.S., Environmental and Sustainability Studies Curriculum Map

Course	Title	Student Learning Outcomes		
		Communication Skills (SLO 1)	Teamwork Skills (SLO 2)	Knowledge Integration (SLO 3)
ESS 1020	Connections: Environment and Sustainability			X
ESS 1100	Intro to Environmental Studies	X	X	X
GEOL 1045	Earth Environment, Resources, and Society			X
BIOL 3120/3130	General Ecology			X
ESS 3710/ CHEM 4710	Chemistry and the Environment	X		X
ESS 3000	Introduction to Environmental law	X	X	X
HIST 3900	Environmental History	X		X
MATH 3070	Statistical Methods I	X		X
SOC 3600	Environmental Sociology	X		X
AGBE 4120	Natural Resource Economics	X		X
ESS 4001	Capstone Experience I	X	X	X
ESS 4002	Capstone Experience II	X	X	X

Appendix 2: SLO1 Assessment Methods

Capstone Rubric for Individual Literature Review Presentation

Rubric for Individual Literature Review Presentation

Student Name(s)_____Final Grade_____

	Power Point Presentation	Oral Presentation	Literature	English Grammar	Time
4	Presentation is effective, and all information is presented thoroughly. Slides are not too wordy, and pictures are used effectively.	Presentation was professional, with smooth transitions. Students gave an effective presentation and didn't just read slides.	Enough sources are used and described in enough detail for the audience to understand.	Proper English grammar was used.	Presentation was 8-10 minutes
3	Presentation is effective, but some information is missing. Slides have more words than needed.	Presentation was effective with a few missteps in transitions. Students read from some slides, but not all of them.	Enough sources are used and described, but the connection between the sources and the issue may be unclear.	Students used proper grammar most of the time.	Presentation was 7 or 11 minutes
2	Presentation is not effective in giving information. Slides are wordy.	Presentation was lacking in information and students had little additional information than was in each slide.	Sources are described, but there are still gaps in the literature.	Presentation was too colloquial.	Presentation was 6 or 12 minutes
1	Presentation doesn't give adequate information. Slides have too many words.	The presentation was inadequate at addressing the problem. Students read exclusively from slides.	Too few sources are used and the connection between sources and the issue are unclear.	Students used poor English.	Presentation was <6 minutes or >12 minutes
Comments					

Capstone Rubric for Team Project Oral Presentation

Rubric for Team Project Oral Presentation

Student Name(s) _____Final Grade_____

	Power Point Presentation	Oral Presentation	English Grammar	Questions	Professional Appearance	Organization	Budget
4	Presentation is effective, and all information is presented thoroughly. Slides are not too wordy, and pictures are used effectively.	Presentation was professional, with smooth transitions. Students gave an effective presentation and didn't just read slides.	Proper English grammar was used.	Students were able to think about and answer all questions asked.	Students had a professional appearance.	Students addressed each part of the proposal in some fashion in the presentation.	Students presented a detailed budget, outlining all supplies and/or equipment needed to carry out the proposed project. Budget was appropriate
3	Presentation is effective, but some information is missing. Slides have more words than needed.	Presentation was effective with a few missteps in transitions. Students read from some slides, but not all of them.	Students used proper grammar most of the time.	Students were able to answer most of the questions asked.	Students dressed professionally, although there were some missteps in dress.	Each part of the proposal was presented, but some detail was lacking.	Students presented a budget, but it lacked some detail. Not all supplies and/or equipment needed were listed. Budget was appropriate.
2	Presentation is not effective in giving information. Slides are wordy.	Presentation was lacking in information and students had little additional information than was in each slide.	Presentation was too conversational.	Students had difficulty answering the majority of the questions asked.	Students did not take much care in their professional appearance (e.g. stains, wrinkles, no tie, etc.)	Students did not address all required sections of the proposal, but most sections were there. Explanation/description was inadequate	Students presented a short budget with no detail. Budget was not appropriate for the proposed project.
1	Presentation doesn't give adequate information. Slides have too many words.	The presentation was inadequate at addressing the problem. Students read exclusively from slides.	Students used poor English.	Students clearly did not understand the project and could not answer questions.	Students made no effort to dress in a professional manner.	Students did not address most of the required sections of the proposal and those addressed were inadequate.	Students did not submit a budget
Comments							

Capstone Rubric for Team Project Written Proposal

Rubric for Team Project Written Proposal

Student Name(s) _____ Final Grade_____

	Thesis/ Problem/ Question	Introduction	Literature Review	Documentation	Methodology	Proposal Structure	Budget
4	Students posed a thoughtful, creative question that engaged them in challenging or provocative research. The proposal contributes to knowledge in a focused, specific area.	Provides a clear and thorough introduction and background that provides clear information about the proposed project. A novice could understand the proposed project.	Students gathered information from a variety of quality electronic and print sources, including appropriate licensed databases. Sources are relevant, balanced and include critical readings relating to the thesis or problem.	Students documented all sources, including visuals, sounds, and animations. Sources are properly cited, both in-text/in-product and on Works-Cited/Works-Consulted pages/slides. Documentation is error-free.	Students effectively and creatively used appropriate communication tools to provide a clear explanation of the proposed experimental methods	Students addressed each required section of the proposal and provided an adequate explanation/description for each section.	Students presented a detailed budget, outlining all supplies and/or equipment needed to carry out the proposed project. Budget was appropriate
3	Students posed a focused question involving them in challenging research.	Provides an introduction and background that is adequate. A novice would not be able to completely understand the proposed project.	Students gathered information from a variety of relevant sources--print and electronic.	Students documented sources with some care, Sources are cited, both in-text/in-product and on Works-Cited/Works-Consulted pages/slides. Few errors noted.	Students provided an adequate explanation of proposed experimental methods.	Students addressed each required section of the proposal. Explanation/description for each selection was less than adequate.	Students submitted a budget, but it lacked some detail. Not all supplies and/or equipment needed were listed. Budget was appropriate.
2	Students constructed a question that lends itself to readily available answers.	Provides an introduction and background that is only somewhat significant to the proposal. A novice would not be able to understand the proposed project.	Students gathered information from a limited range of sources and displayed minimal effort in selecting quality resources.	Students needed to use greater care in documenting sources. Documentation was poorly constructed or absent.	Students provided a less than adequate explanation of proposed experimental methods.	Students did not address all required sections of the proposal, but most sections were there. Explanation/description was inadequate	Students submitted a short budget with no detail. Budget was not appropriate for the proposed project.
1	Students developed a question requiring little creative thought.	Students gathered information that lacked relevance, quality, depth and balance. Even someone familiar with the proposed project would have trouble understanding.	Students did not gather any references for the proposal.	Students clearly plagiarized materials.	Students no explanation of methods to be used to carry out proposed project.	Students did not address most of the required sections of the proposal and those addressed were inadequate.	Students did not submit a budget
Comments							

ESS Exit Survey Form

TENNESSEE TECHNOLOGICAL UNIVERSITY
ENVIRONMENTAL AND SUSTAINABILITY STUDIES PROGRAM
UNDERGRADUATE SURVEY

ESS Concentration/Option: _____ Advisor: _____

Semesters in the ESS program (counting summers): _____ Graduation Date (mm/yy): _____

Please rate your satisfaction or estimate the quality of the following items. Results will be kept anonymous

		Poor	Fair	Good	Excellent	Not Applicab
Quality of courses in preparing me for my future		1	2	3	4	n/a
Quality of instruction in:	ESS 1020 Connections/Env-Sust. Studies	1	2	3	4	n/a
	ESS 1100 Intro to Environmental Studies	1	2	3	4	n/a
	ESS 3000 Intro to Environmental Law	1	2	3	4	n/a
	ESS 3710 Chemistry & the Environment	1	2	3	4	n/a
	ESS 4001 Society/Envmt.-Capstone Exp 1	1	2	3	4	n/a
	ESS 4002 Society/Envmt.-Capstone Exp 2	1	2	3	4	n/a
	ESS 4300 Environmental Management System	1	2	3	4	n/a
Availability of desired courses		1	2	3	4	n/a
Opportunity for formal student evaluation of your instructors in ESS courses		1	2	3	4	n/a
Organization and clarity of ESS degree requirements		1	2	3	4	n/a
Opportunities for professional and personal interactions with faculty		1	2	3	4	n/a
Progress you made in learning to think critically and analyze ESS problems		1	2	3	4	n/a
Progress you made in learning to use the scientific literature		1	2	3	4	n/a
Progress you made in learning to keep organized research/laboratory records		1	2	3	4	n/a
Progress you made in working collaboratively on an interdisciplinary capstone team		1	2	3	4	n/a
Progress you made integrating interdisciplinary knowledge to solve environmental problems		1	2	3	4	n/a
Progress you made in learning to apply statistical analysis to data		1	2	3	4	n/a
Progress you made in learning to effectively communicate scientific info		1	2	3	4	n/a
Availability of your advisor		1	2	3	4	n/a
Willingness of your advisor to assist		1	2	3	4	n/a
Competence of your advisor during advising sessions		1	2	3	4	n/a
Quality of curricular advising		1	2	3	4	n/a
Quality of career advising		1	2	3	4	n/a
Quality of classroom facilities		1	2	3	4	n/a
Quality of laboratory facilities		1	2	3	4	n/a
Quality of TTU library holdings		1	2	3	4	n/a
Quality of computer support		1	2	3	4	n/a
Availability of a stimulating intellectual atmosphere conducive to learning		1	2	3	4	n/a
Assistance given by departmental secretaries		1	2	3	4	n/a

Quality of my initial contact \\iththe program	2	3	4	nla
Opportunity for student participation in departmental decisions	2	3	4	nla
Overall quality of the program	2	3	4	nla
Overall satisfaction with ESS degree program	2	3	4	nla

Please take time to share your thoughts and perceptions of the School of Environmental Studies in order to foster the improvement of the Environmental and Sustainability Studies program and faculty.

List or discuss the strengths of the appropriate department or faculty

List or discuss the weakness of the appropriate department or faculty.

Any suggestions you may have to improve the ESS program.