

**Institutional Effectiveness
2022-2023**

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): *See Appendix 1.

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

SLO 1: ABILITY TO INTEGRATE KNOWLEDGE

Define Outcome:

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 can rate their learning progress in key areas such as critical thinking skills 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 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 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. Full rubrics can be found in the appendices.
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).
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) Average student perception of the appropriate progress area for each ESS course is at the 3.0 level or higher, 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.
2. **Rubrics for senior capstone:** 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:** 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.
4. **Major Field Exam:** The criteria for success would be an overall average score of 70 or better.

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:

1. **IDEA Student Evaluation Results**
 IDEA results were analyzed for undergraduate ESS courses taught during 2022-2023. Results from the previous four academic years are also shown for comparison (Table 1). The overall average student perception of progress on the IDEA statement, "Learning to analyze and critically evaluate ideas, arguments, and viewpoints" was a 4.0. This meets the established benchmark but is down very slightly from previous years.

Table 1. Student-rated progress on IDEA Objective related to SLO 1 for ESS courses taught during the most recent five academic years.

Course	IDEA Objectives				
	Learning to analyze and critically evaluate ideas, arguments, and viewpoints.				
	19	20	21	22	23
ESS 1020	--	5.0	3.8	4.0	--

ESS 1100	4.5	4.1	4.4	4.3	3.9
ESS 1100 (online)	--	--	--	--	4.5
ESS 2100	--	--	--	4.5	4.2
ESS 3000	3.8	4.8	3.3	4.8	4.1
ESS 3710	--	3.6	3.0	3.5	3.1
ESS 3100	--	--	--	5.0	4.8
ESS 3200	--	--	--	--	4.5
ESS 4001	--	5.0	3.8	3.8	3.7
ESS 4002	--	4.9	4.3	3.6	2.4
ESS 4100	--	--	--	3.8	4.1
ESS 4110	--	--	4.8	--	4.3
Average Score	4.2	4.6	4.1	4.1	4.0

Abbreviations: "--" indicates that the instructor did not select that particular IDEA objective as important or essential during 2018-2019 academic years (all data were reported for the 2019-2020, 2020-21, 2021-2022, and 2022-2023 academic years, regardless of whether the instructor selected the objective as important or essential).

2. Rubrics for Senior Capstone Course

In Spring Semester 2023, capstone students scored a 22.5 out of 24 (94%) on their capstone presentation, as compared with 93% in spring 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.”

3. Senior Exit Survey

Twelve graduating seniors completed exit surveys in 2022-2023, with results shown in Table 2. This cohort of students represented the eighth 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 quite good (3.6/4.0). The score was up from the past two years, but down slightly from the previous three years.

Table 2. 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)
Environmental problem solving	3. Environmental problem solving	3.9	3.9	3.8	3.4	3.4	3.6

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

4. 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. See Table 3.

Table 3: Summary of Major Field Exam Scores

ESS Major Field Exam Summary		Percent Correct		
	Core Courses/Exam Sections	2020-21	2021-22	2022-23
1	Introduction to Environmental Studies	71	60	73
2	Earth, Environment, Resources and Society	71	43	46

3	Statistical Methods	54	45	45
4	General Ecology	66	68	70
5	Chemistry and the Environment	43	39	55
6	Environmental Law	74	57	75
7	Environmental Sociology	83	87	80
8	Environmental History	57	44	58
9	Natural Resource Economics	57	60	58
10	ESS Broad Student Learning Objectives	80	68	86
Average Score on all Sections		66	57	65
Range of Total Scores by Students		48-76	50-76	40-82
Mean Score of Students		66	61	65

Use of Results to Improve Outcomes:

Overall the indicators show that students are doing well and perceive they are doing well in learning to integrate and apply the knowledge they have acquired. Once again, we are addressing the capstone communication concerns and expect excellent results this year.

Over the past couple of 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.

SLO 2: ABILITY TO WORK COLLABORATIVELY

Define Outcome:

- 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 can rate their learning progress in key areas

such as interdisciplinary teamwork 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)*: A rubric 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 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. Full rubrics can be found in the appendices.

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).

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) Average student perception of the appropriate progress area for each ESS course is at the 3.0 level or higher, 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.
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.

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:

1. *IDEA Student Evaluation Results*

IDEA results were analyzed for undergraduate ESS courses taught during 2022-2023. Results from the previous four academic years are also shown for comparison (Table 4). In 2022-2023, average scores for student perception of progress on teamwork, as well oral and written communication were down slightly.

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.

Table 4. Student-rated progress on IDEA Objectives related to student learning outcomes for ESS courses taught during the most recent five academic years.

Course	IDEA Objectives				
	Acquiring skills in working with others as a member of a team				
	19	20	21	22	23
ESS 1100	4.6	4.2	4.0	4.2	3.9
ESS 1100 (online)	--	--	--	--	3.1
ESS 2100	--	--	--	3.0	3.3
ESS 3000	4.2	4.5	1.9	4.9	3.0
ESS 3710	--	3.0	1.7	2.4	2.4
ESS 3100	--	--	--	4.7	4.0
ESS 3200	--	--	--	--	3.5
ESS 4001	5.0	5.0	4.2	4.4	4.1

ESS 4002	4.3	5.0	4.6	4.5	3.0
ESS 4100	--	--	--	2.5	3.1
ESS 4110	--	--	3.4	--	3.5
Average Score	4.5	4.5	3.6	4.0	3.4

Abbreviations: "--" indicates that the instructor did not select that particular IDEA objective as important or essential during 2018-2019 academic years (all data were reported for the 2019-2020, 2020-21, 2021-2022, and 2022-2023 academic years, regardless of whether the instructor selected the objective as important or essential).

2. 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. During Fall Semester 2022, in collaboration with TTU’s Office of Sustainability, the capstone teams began the process of developing a sustainability plan for the university.

The capstone team did not write a formal proposal in Fall 2022 because of the nature of the project; therefore, other measure will have to be used to evaluate progress in teamwork.

The capstone instructors developed a new rubric for evaluation of the final presentation in ESS 4002 that was first implemented in the 2018-2019 academic year. The students in spring 2023 scored 22.5 out of 24 (94%) on their capstone presentation, as compared with 93% in spring 2021, 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.)

3.Senior Exit Survey

Twelve graduating seniors completed exit surveys in 2022-2023, with results shown in Table 5. This cohort of students represented the eighth 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 2022-23 senior exit survey show an increase from the previous year and more in line with other years.

Table 5. Average scores from ESS senior exit survey results for four survey questions related to student learning outcomes.

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

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

Use of Results to Improve Outcomes:

Students demonstrated their ability to work in teams by the quality of the final presentation in Spring 2023 (94% score). The primary consideration for the upcoming year is to address the lack of teamwork exercises in a number of ESS courses. The consideration should be whether to encourage more teamwork in those courses or to recognize that significant team-based learning is not necessary in all courses in order for students to learn teamwork skills within the ESS program.

SLO 3: EFFECTIVE COMMUNICATION OF SCIENTIFIC INFORMATION

Define Outcome:

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 can rate their learning progress in key areas such as oral and written communication 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 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 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. Full rubrics can be found in the appendices.

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).

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) Average student perception of the appropriate progress area for each ESS course is at the 3.0 level or higher, 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.
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.

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:

1. *IDEA Student Evaluation Results*
IDEA results were analyzed for undergraduate ESS courses taught during 2022-2023. Results from the previous three academic years are also shown for comparison (Table 6). The average score for student perception of oral and written skill development in ESS courses taught during the 2022-23 academic year was 3.6 out of a possible score of 5. While this still reflects that students typically feel they have made moderate to substantial progress, this is down from previous years. Faculty will discuss this during the fall to determine potential causes and correct them. The score for ESS 4002, second semester of the capstone, was particularly low. Faculty members have already discussed the concern, identified the potential reasons and have incorporated measures to address it. Of the ten ESS courses offered, four were just at or above the 4.0 score, indicating student perception of "substantial progress."

Table 6. Student-rated progress on IDEA Objectives related to student learning outcomes for ESS courses taught during the most recent four academic years.

Course	IDEA Objectives			
	Developing skill in expressing myself orally or in writing			
	'20	'21	'22	'23
ESS 1020	5.0	4.3	4.0	--
ESS 1100	3.5	3.8	3.9	3.6
ESS 2100	--	--	5.0	3.9
ESS 3000	4.3	2.9	4.5	3.2
ESS 3710	3.4	3.1	3.3	3.0
ESS 3100	--	--	5.0	4.3
ESS 3200	--	--	--	4.3
ESS 4001	5.0	4.0	4.0	3.6
ESS 4002	4.9	4.3	3.6	2.2
ESS 4100	--	--	4.0	3.9
ESS 4110	--	4.4	--	3.6
Average Score	4.4	4.0	4.1	3.6

2. 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 those is included in Table 7 below, alongside scores from 2020-21.

Table 7: Rubric Summary for Individual Literature Reviews and Presentations

	2021-22	2022-23
Rubric Category	n=21	n=15
PowerPoint Slides	3.4	3.3
Oral Presentation	3.5	3.6
Literature Sources	3.8	3.4
Grammar Usage	3.7	3.3
Timing	3.6	3.1

Total Score	18/20	16.7/20
Percent Score	90%	84%

Students overall did well finding a variety of sources for their literature reviews and putting together informative and visually appealing slides. Overall, their oral presentations were good. While down slightly from the previous year, these scores met the criteria for success.

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 2023, students scored an average 94% on the rubric indicators (Table 8), as compared with 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.)

In Spring 2023, the students presented to TTU’s Office of Sustainability the first draft of a sustainability strategic plan for Tennessee Tech. The students did an excellent job in their formal presentation. Their work showed they had worked diligently to pull together a proposal under difficult circumstances.

Table 8: Rubric for Research Project Presentation

	Power Point Presentation	Oral Presentation	English Grammar	Questions	Professional Appearance	Organization	Budget	Total Score
Spring 2021	3.75	3.75	3.75	4.0	4.0	3.75	3.0	93%
Spring 2023	3.75	3.75	4.0	3.25	4.0	3.75	N/A	94%

3. Senior Exit Survey

Twelve graduating seniors completed exit surveys in 2022-2023, with results shown in Table 9. This cohort of students represented the eighth 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 even stronger about their progress in communicating scientific information (3.8/4.0). This was the highest score in the last six years.

Table 9. Average scores from ESS senior exit survey results for four survey questions related to student learning outcomes.

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

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

Use of Results to Improve Outcomes:

The measures related to SLO 3, “Students will communicate scientific information effectively in writing, orally, and visually,” were mixed, with some measures higher and others virtually the same or lower. The most glaring need was in strengthening the communication skills (or at least student perception) within the capstone. The past year was problematic in that students were encouraged to communicate directly with the “client” the class was working with and overall communication was at best confusing. Capstone instructors have addressed that by incorporating structure to assure regular two-way and clear communication.

Summative Evaluation:

SLO1: Overall, the indicators show that students are doing well and perceive they are doing well in learning to integrate and apply the knowledge they have acquired. Once again, we are addressing the capstone communication concerns and expect excellent results this year.

Over the past couple of 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.

SLO2: Students demonstrated their ability to work in teams by the quality of the final presentation in Spring 2023 (94% score). The primary consideration for the upcoming year is to address the lack of teamwork exercises in a number of ESS courses. The consideration should be whether to encourage more teamwork in those courses or to recognize that significant team-based learning is not necessary in all courses in order for students to learn teamwork skills within the ESS program.

SLO3: The measures related to SLO 3, “Students will communicate scientific information effectively in writing, orally, and visually,” were mixed, with some measures higher and others virtually the same or lower. The most glaring need was in strengthening the communication skills (or at least student perception) within the capstone. The past year was problematic in that students were encouraged to communicate directly with the “client” the class was working with and overall communication was at best confusing. Capstone instructors have addressed that by incorporating structure to assure regular two-way and clear communication.

Assessment Plan Changes:

List of Appendices:

Appendix 1: Curriculum Map, Environmental and Sustainability Studies B.S.

Appendix 2: Capstone Rubric for Individual Literature Review Presentation R23

Appendix 3: Capstone Rubric for Team Project Oral Presentation R23

Appendix 4: Capstone Rubric for Team Project Written Proposal R23

Appendix 5: ESS Exit Survey Form

Appendix 1: Curriculum Map, Environmental and Sustainability Studies, B.S.

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: Capstone Rubric for Individual Literature Review Presentation R23

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					

Appendix 3: 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							

Appendix 4: Capstone Rubric for Team Project Written Proposal R23

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 section 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							

Appendix 5: 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 Applicable
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/Enmnt.-Capstone Exp 1	1	2	3	4	n/a
ESS 4002 Society/Enmnt.-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 <u>curricular</u> advising	1	2	3	4	n/a
Quality of <u>career</u> 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

Appendix 5: ESS Exit Survey Form, cont.

Quality of my initial contact with the program	1	2	3	4	n/a
Opportunity for student participation in departmental decisions	1	2	3	4	n/a
Overall quality of the program	1	2	3	4	n/a
Overall satisfaction with ESS degree program	1	2	3	4	n/a

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.