



Final Annual Report

Tennessee Tech University

President

Provost

College of Interdisciplinary Studies

School of Environmental Studies

Environmental and Sustainability Studies BS



Concentration and Options

Department/Unit Contact: Dr. Hayden Mattingly

Mission/Vision/Goal Statement

Concentrations and Options: The B.S. degree program in Environmental and Sustainability Studies (ESS) has three concentrations. Two of the three concentrations have sub-concentrations (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



Department Mission: Environmental and Sustainability Studies B.S.

Department/Unit Contact: Dr. Hayden Mattingly

Mission/Vision/Goal Statement



Department 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.



History and Enrollment

Department/Unit Contact:

Mission/Vision/Goal Statement

History and Enrollment: The ESS degree program was initiated in Fall 2012 and will be starting its sixth academic year in August 2017. Enrollment has been steady at approximately 40-45 students for the past three years. Two students graduated in 2014-2015, eight in 2015-2016, and 12 in 2016-2017. The concentration with the highest number of students is Environmental Science, especially in the Biology and Natural Resources options.



Program Goal 1

Define Goal

Program Goal 1: Graduates will be able to analyze and propose sustainable solutions for complex, real-world environmental problems.

Intended Outcomes / Objectives

Student Learning Outcomes:

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

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

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



Program Goal 2

Define Goal

Program Goal 2: Graduates should understand and integrate ideas from the ecological, social, and physical sciences with technological solutions.

Intended Outcomes / Objectives

Student Learning Outcomes:

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

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

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

Assessment Tools for Learning Outcomes:

Goal/ Outcome/ Objective: Program Goal 1, 2/Learning Outcomes 1,2,3

Type of Tool: Other

Rationale

 [Project Rubric](#)

Frequency of Assessment: Annual

Assessment Tools for Learning Outcomes: IDEA Student Evaluation Results

Goal/ Outcome/ Objective: Program Goal 1, 2/Learning Outcomes 1, 2, 3

Type of Tool: Other

Rationale

Assessment Methods:

Assessment Tools for Learning Outcomes:

IDEA student evaluation results (direct measure). IDEA evaluations are administered for each course in the curriculum. Students can rate their learning progress in key areas such as interdisciplinary teamwork, oral and written



communication, and critical thinking skills. (Outcomes 1, 2, 3)

Rationale for Outcomes and Assessments (Process for Data Analysis):

IDEA student evaluation results: The director of the school will monitor the percent of instructors identifying interdisciplinary training/teamwork, oral communication, written communication and critical thinking as a key course objective, and the percent of students who report citing progress in these related skills to their course. The results will be summarized by the director and discussed with the associate faculty committee and dean during August of each year.

Frequency of Assessment: Annual



Assessment Tools for Learning Outcomes: Rubric for Senior Capstone Course

Goal/ Outcome/ Objective: Program Goal 1, 2/Learning Outcomes 1, 2, 3

Type of Tool: Capstone Project, Rubric

Rationale

Assessment Methods:

Assessment Tools for Learning Outcomes:

Rubric for senior capstone course (direct measure). Each senior capstone proposal and final project will be assessed using a rubric that evaluates the proposal or project based on criteria such as the quality of the research question, introduction, literature review, documentation, methodology, proposal structure, and budget (Appendix 1). (Outcomes 1, 2, 3)

Rationale for Outcomes and Assessments (Process for Data Analysis):

Rubric for senior capstone course: The rubric shown in Appendix 1 generates a score 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. The rubric scores will be monitored by the director and discussed with program faculty and the dean each year during the August/September associate faculty meeting.

Frequency of Assessment: Annual



Assessment Tools for Learning Outcomes: Senior Exit Survey

Goal/ Outcome/ Objective: Program Goal 1, 2/Learning Outcomes 1, 2, 3

Type of Tool: Capstone Project, Rubric, Survey, Other

Rationale



Assessment Methods:

Assessment Tools for Learning Outcomes:

Senior exit survey (direct measure). Each graduating senior will complete a departmental exit survey on or near the time of the exit interview with the program director. The survey has 31 questions to rate the quality of program components on a scale from 1 (poor) to 4 (excellent). (Outcomes 1, 2, 3)

Rationale for Outcomes and Assessments (Process for Data Analysis):

Senior exit survey: The written survey provides the opportunity for quantitative feedback from students about specific aspects of the degree program, including the curriculum, advising, facilities and related student experiences while at TTU. In addition, a number of survey questions are directly related to specific learning outcomes. The results are summarized by the director and discussed with program faculty and the dean during the August meeting each year.

Frequency of Assessment: Annual



Results:

Goal/Objective/Outcome Number: Goals 1, 2/Outcomes 1, 2, 3

Results

Attachments

No items to display.



Results: IDEA Student Evaluation Results

Goal/Objective/Outcome Number: Goals 1, 2/Outcomes 1, 2, 3

Results

IDEA student evaluation results. (Outcomes 1, 2, 3). IDEA results were analyzed for all undergraduate ESS courses taught during 2016-2017. Results from 2014-2015 and 2015-2016 are also shown for comparison (Table 2). Instructors did not select the three IDEA objectives as frequently in 2015-2016 and 2016-2017 as they did in 2014-2015. Keeping in mind the lower rate of selection, average scores for student progress on teamwork, oral and written communication, and critical thinking were still greater than 4.0 for ESS courses for all three objectives (average of 4.4., 4.7, and 4.4). In fact, these 2016-2017 scores were higher than 2015-2016 scores for all three objectives. It was again encouraging to see program-wide average ratings above 4.0 on a 5-point scale, as observed in previous years.



Table 2. Student-rated progress on three IDEA Objectives related to student learning outcomes for ESS courses taught during academic years 2014-2015 (14-15), 2015-2016 (15-16), and 2016-2017 (16-17). Note: “n/a” indicates that a course either was not offered or not evaluated in that particular year; “--” indicates that the instructor did not select that particular IDEA objective as “important” or “essential”.

Course	IDEA Objectives								
	Acquiring skills in working with others as a member of a team			Developing skill in expressing myself orally or in writing			Learning to analyze and critically evaluate ideas, arguments, and viewpoints		
	14-15	15-16	16-17	14-15	15-16	16-17	14-15	15-16	16-17
ESS 1020	4.3	--	4.6	--	--	4.4	--	--	3.6
ESS 1100	4.4	--	--	3.8	--	--	4.3	3.8	--
ESS 3000	4.3	n/a	n/a	4.1	n/a	n/a	4.7	n/a	n/a
ESS 3710	--	--	--	3.6	--	--	3.6	--	--
ESS 4001	4.7	4.1	4.7	4.0	3.4	--	3.7	3.9	4.5
ESS 4002	4.7	4.5	4.9	4.5	--	--	4.2	--	--
ESS 4093	n/a	--	n/a	n/a	4.7	n/a	n/a	4.7	n/a
ESS 4300	n/a	n/a	3.0	n/a	n/a	--	n/a	n/a	--
ESS 4900	n/a	n/a	5.0	n/a	n/a	5.0	n/a	n/a	5.0
Average Score	4.5	4.3	4.4	4.0	4.1	4.7	4.1	4.1	4.4

**Attachments**

No items to display.

**Results: Rubric for Senior Capstone Course**

Goal/Objective/Outcome Number: Goals 1, 2/Outcomes 1, 2, 3

Results

Rubric for senior capstone course. (Outcomes 1, 2, 3). In the capstone sequence the first course (ESS 4001) entails development of a proposal to conduct a specific project while the second course (ESS 4002) involves actually carrying out the project. During Fall 2016, the capstone teams designed a community outreach and education plan for reintroducing the endangered bluemask darter into the Calfkiller River watershed. The average student team score in 2016-2017 on the proposal phase of the project was XX out of 100, compared to scores of 86% in 2015-2016, 93% in 2014-2015, and 70% in 2013-2014. The capstone instructors are in the process of developing a rubric for ESS 4002, a draft of which is shown in Appendix 2.

Attachments

No items to display.


Results: Senior Exit Survey
Goal/Objective/Outcome Number: Goals 1, 2/Outcomes 1, 2, 3

Results

Senior exit survey. (Outcomes 1, 2, 3). Eight graduating seniors completed exit surveys, with results shown in Table 1. This was the second year we had a cohort of graduating seniors (our program is only five years old), and these data will help form a baseline to which future years can be compared. Students rated the quality of the ESS program (1 = poor; 2 = fair; 3 = good; 4 = excellent) for two questions related to developing their communication skills: (a) how well they learned to use scientific literature and (b) how well they learned to develop and practice good scientific communication skills in general. The average score on scientific literature increased from 3.2 to 3.7 this year, and the average score on communicate skills increased from 3.3 to 3.6 this year. To more directly assess Learning Outcome 2, we added a new question for 2016-2017, "Progress you made in working collaboratively on an interdisciplinary capstone team," that was not on the 2015-2016 survey. However, the question was not on all surveys due to the variable timing of administering the surveys, and only one student responded to the question, with a score of 3. For the environmental problem-solving question, the average score increased from 3.5 to 3.8 this year. Furthermore, on all four questions, students only answered with 3 or 4 (good or excellent) this year, compared to last year when some answers were 2 (fair).

Table 1. Senior exit survey results for three survey questions related to student learning outcomes. Questions about the quality of the ESS program components could be answered on a scale of 1 (poor) to 4 (excellent). Data shown are from six students in 2015-2016 and eight students in 2016-2017.



Survey question	Associated Learning Outcome	2015-2016 (<i>n</i> = 6 students)		2016-2017 (<i>n</i> = 8 students)	
		Mean	Range	Mean	Range
Use of scientific literature	1. Communication skills	3.2	2-4	3.7	3-4
Communicating scientific information	1. Communication skills	3.3	2-4	3.6	3-4
Collaborative capstone teamwork	2. Interdisciplinary teamwork	n/a	n/a	n/a	3
Environmental problem solving	3. Environmental problem solving	3.5	2-4	3.8	3-4

Attachments

No items to display.



Modifications and Continuing Improvement: Program Changes due to Assessments (Outcome 1)

Goal/Objective/Outcome Number: Outcome 1

Program Changes and Actions due to Results

For Outcome 1 (communicate scientific information effectively): The director met with the associate faculty in October 2016 to discuss the assessment approach and results for academic year 2015-2016. Faculty were generally satisfied with student progress on communication, and no major changes were recommended. Nevertheless, faculty decided that improvements could still be made, especially in the capstone course. Therefore, the faculty decided to hold another retreat in June 2017 for the purposes of continuing to improve the two-semester senior capstone course sequence. The IDEA results for 2016-2017 (Table 2) will be presented to the associate faculty in the upcoming Fall 2017 meeting. Any additional program modifications will be determined at that meeting.

Link to Assessment

Link to Flight Plan:



Modifications and Continuing Improvement: Program Changes due to Assessments (Outcome 2)

Goal/Objective/Outcome Number: For Outcome 2 (work collaboratively on interdisciplinary teams)

Program Changes and Actions due to Results

For Outcome 2 (work collaboratively on interdisciplinary teams): The widespread use of teams in the ESS curriculum, especially in ESS 4001 and ESS 4002, has been successful and the students are providing high IDEA ratings regarding their progress on this objective. The faculty discussed using multiple teams in the capstone courses in 2016-2017 (due to increasing enrollment) but no other major modifications were made at this time. However, the director realized that there were no questions on the senior exit survey specifically addressing collaborative work on interdisciplinary teams. We added a question on collaborative teamwork (see above) and will be able to collect more data on this objective in the 2017-2018 academic year as more seniors graduate.

Link to Assessment

Link to Flight Plan:



Modifications and Continuing Improvement: Program Changes due to Assessments (Outcome 3)

Goal/Objective/Outcome Number: For Outcome 3 (integrate knowledge from multiple disciplines to solve problems):

Program Changes and Actions due to Results

For Outcome 3 (integrate knowledge from multiple disciplines to solve problems): Students are being challenged to integrate knowledge from multiple disciplines, particularly in the capstone (ESS 4001/4002) courses. As shown in Tables 1 and 2, the student-rated scores in this area are generally high. Nonetheless, we held a faculty retreat in June 2017 to continue working on improving the capstone courses and our ability to enhance our students' environmental problem-solving skills.

Link to Assessment

Link to Flight Plan: