Institutional Effectiveness
2018-2019

Program: Environmental and Sustainability Studies BS

College and Department: College of Interdisciplinary Studies – School of Environmental Studies

Contact: Dr. Tammy Boles

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.

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

Program Goals:

1. Graduates will be able to analyze and propose sustainable solutions for complex, real-world environmental problems.
2. Graduates should understand and integrate ideas from the ecological, social, and physical sciences with technological solutions.

Student Learning Outcomes:

1. Students will communicate scientific information effectively in writing, orally, and visually.
2. Students will demonstrate the ability to work collaboratively on interdisciplinary teams.
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 can rate their learning progress in key areas such as interdisciplinary teamwork, oral and written communication, and critical thinking skills. (Outcomes 1, 2, 3)

   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 the Fall Semester meeting each year.

2. *Rubric for senior capstone course (direct measure):* Each senior capstone proposal and final project will be assessed by faculty using rubrics that evaluate the proposal or final presentation based on criteria such as the quality of the research question, introduction, literature review, documentation, methodology, proposal structure, and budget (Outcomes 1, 2, 3)

   The rubric shown in Appendix 2 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 Fall Semester associate faculty meeting. Another rubric (Appendix 3) was developed this year to evaluate the capstone presentation that is given in the second semester (Spring Semester) of the two-semester capstone sequence.

3. *Senior exit survey (indirect 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 from the student's perspective on a scale from 1 (poor) to 4 (excellent). (Outcomes 1, 2, 3)

   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 Fall Semester meeting each year.

Results:

IDEA student evaluation results. (Outcomes 1, 2, 3).

IDEA results were analyzed for all undergraduate ESS courses taught during 2017-2018 and 2018-2019. Results from the previous five academic years are also shown for comparison. In the past two years, average scores for student progress on teamwork, oral and written communication, and critical thinking were generally greater than 4.0. The one exception occurred in 2018-2019 for oral and written communication when the average was 3.8, but only two instructors selected that particular IDEA objective for evaluation that year. It was encouraging to see program-wide average ratings generally above 4.0 on a 5-point scale, as observed in previous years. Across all five years, the average teamwork score ranged from 4.3 to 4.5 and the average teamwork score ranged from 4.1 to 4.4, both showing

strong interannual stability. On the other hand, the oral and written communication average score was more variable across years, peaking with a high score of 4.7 in 2016-2017 and dipping to a low score of 3.8 in 2018-2019.

Student-rated progress on three IDEA Objectives related to student learning outcomes for ESS courses taught during the past five academic years. Abbreviations: column headings "15" = academic year 2014-2015, "16" = 2015-2016, and so forth; "no" indicates that a course either was either not offered or not evaluated in that particular year; and "--" 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				
	15	16	17	18	19	15	16	17	18	19	15	16	17	18	19
ESS 1020	4.3	--	4.6	--	no	--	--	4.4	--	no	--	--	3.6	--	no
ESS 1100	4.4	--	--	4.7	4.6	3.8	--	--	--	--	4.3	3.8	--	4.6	4.5
ESS 3000	4.3	no	no	3.3	4.2	4.1	no	no	3.6	3.9	4.7	no	no	3.4	3.8
ESS 3710	--	--	--	--	--	3.6	--	--	--	--	3.6	--	--	--	--
ESS 4001	4.7	4.1	4.7	4.8	5.0	4.0	3.4	--	4.4	--	3.7	3.9	4.5	--	--
ESS 4002	4.7	4.5	4.9	4.6	4.3	4.5	--	--	4.5	--	4.2	--	--	--	--
ESS 4093	no	--	no	4.0	--	no	4.7	no	4.5	--	no	4.7	no	4.4	4.3
ESS 4300	no	no	3.0	--	--	no	no	--	--	3.7	no	no	--	--	--
ESS 4900	no	no	5.0	--	no	no	no	5.0	--	no	no	no	5.0	--	no
Average Score	4.5	4.3	4.4	4.3	4.5	4.0	4.1	4.7	4.3	3.8	4.1	4.1	4.4	4.1	4.2

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 2018, the capstone teams designed a project focused on illegal dumpsites in the Upper Cumberland region. The average student team score in Fall 2018 on the proposal phase of the project was 91 out of 100 (91%), compared to scores of 88% in Fall 2017, 80% in Fall 2016, 86% in Fall 2015, 93% in Fall 2014, and 70% in Fall 2013. The capstone instructors developed a new rubric for evaluation of the final presentation in ESS 4002, as shown in Appendix 3, that was implemented in the 2018-2019 academic year. The students in Spring 2019 scored 93% on their capstone presentation, representing our first data point obtained using this new rubric.

Senior exit survey. (Outcomes 1, 2, 3).

Fourteen graduating seniors completed exit surveys in 2017-2018, and nine graduating seniors completed surveys in 2018-2019, with results shown below. These two cohorts of students represented the third and fourth graduating groups of seniors in our recently established 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 average score on scientific literature increased to 3.9 this year, the highest of the four years to date. The average score on communication skills has remained relatively stable at 3.6 or 3.7 for the past three years. Progress on working collaboratively on an interdisciplinary capstone team increased from 3.5 to 3.8 this past year, while the environmental problem-solving average scores have remained stable at 3.8 or 3.9 for the past three years.

Average scores from ESS senior exit survey results for four 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). The values shown for each year are the mean scores on a scale of 1 to 4 from those students who provided answers to each specific question. Sample sizes (*n* = number of students who completed the senior exit survey) are shown for each academic year.

Survey Question	Associated Learning Outcome	Academic Year			
		2015-2016 (*n* = 6)	2016-2017 (*n* = 8)	2017-2018 (*n* = 14)	2018-2019 (*n* = 9)
Use of scientific literature	1. Communication skills	3.2	3.7	3.6	3.9
Communicating scientific information	1. Communication skills	3.3	3.6	3.6	3.7
Collaborative capstone teamwork	2. Interdisciplinary teamwork	--	--	3.5	3.8
Environmental problem solving	3. Environmental problem solving	3.5	3.8	3.9	3.9

Modifications for Improvement:

ESS 4002 capstone instructors developed a new rubric for evaluating the final research presentation in, as shown in Appendix 3. This year was the first year of use and provided an addition assessment of student learning related to that was implemented in the 2018-2019 academic year. The students in Spring 2019 scored 93% on their capstone presentation, representing our first data point obtained using this new rubric. Future reports will analyze scores for each rubric category.

Appendices

1. Curriculum Map
2. Research Proposal Rubric
3. Research Presentation Rubric

Appendix 1: Curriculum Map

Environmental Studies BS

Course	Title	Goals/Learning Outcomes		
		Integrate Knowledge	Communication skills	Teamwork skills
ESS 1100	Intro to Environmental Studies	X	X	X
ESS 1020	Connections to the Environment and Sustainability Studies	X		
GEOL 1045	Earth Environment, Resources and Society	X		
BIOL 3120/3130	General Ecology	X		
ESS 3710/ 4710 CHEM 3710/ 4710	Chemistry and the Environment	X	X	
ESS 3000	Intro 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: Research Proposal Rubric

Rubric for ESS 4001 Capstone course to evaluate the quality of the students' research project proposal.

	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

Appendix 3: Research Presentation Rubric

Rubric for ESS 4002 Capstone course to evaluate the quality of the students' research presentation.

	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