

Environmental Health and Safety Bachelors Program: ABET Assessments
Results
Spring 2020 to Spring 2022

Table 4.1: Student Outcomes Assessment (Courses and Schedule-Last Two Years on latest ABET Criteria)-also illustrates frequency of collection

STUDENT OUTCOME	Fall 20	Spring, 21	Fall, 21	Spring, 22
1. An ability to identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline.	EHS 211, 311, 313, 457	EHS 432,	EHS 311, 313, 457	EHS 432
2. An ability to formulate or design a system, process, procedure or program to meet desired needs.		EHS 214, 432, 436 , 498		EHS 432, 436, 498
3. An ability to develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions.	EHS 313 , 311, 211, 457		EHS 313, 311, 457	
4. An ability to communicate effectively with a range of audiences.		EHS 214, 315, 432, 498		EHS, 315, 432, 498
5 An ability to understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts.	EHS 220, 313 469	EHS 436, 498	EHS 313, 469,	EHS 498, 432
6. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.		EHS 432, 498, EHS 315 (COVID impacts prevented)		EHS 432, 498, 315

Note EHS 214 data is Spring 2020

Table 4.2.1: SLO 1: Results-Two Year Data

Fall 2020 Semester									
SLO1									
Course	Total	High	Low	Medium	% achieve >75%	Average Assignment	Average Class	Assignment Type	Instructor
211	14	100	0	50	79	85	86	Exam 3 Question	O
211M	2	30	30	30	0	30	89		
211DL	12	100	0	45	50	61	90		
311	15	100	61	81	100	80	96	chapter 3 assignment problem 3	D
311M	2	75	61	68	50	68	91		
311DL	13	100	70	82.5	100	85	96		
313	10	100	0	85	80	69	84	Lab 1 (2 students-no work)	S
313M	1							person did not turn in work	
313DL	9	100	0	85	77	87	87		
457	10	100	0	0	20	22	78	Exam 1 Question	O
457M	2	0	0	0	0	0	82		
457DL	8	100	0	25	33	36	78		

Fall & Spring 2021 Semesters										
SLO1										
Sem	Course	Total	High	Low	Med	% achieve >75%	Average-Assignment	Average-Class	Assignment Type	Instructor
F21	311	11	100	80	100	100	97	94	chapter 3 assignment problem 3	D
	311M	1	100	100	100	100	100	97		
	311DL	10	100	80	99	100	96	94		
F21	313	14	100	72	82	71	84	85	EHS 313: Lab 1:	S
	313M	2	88	85		100	86	94		
	313DL	12	100	72	82	83	84	81		
F21	457	20	100	0	25	10	17	80	Exam 1 Question	O
	457M	1	0	0	0	0	0	85		
	457DL	19	50	0	0	0	4	76		
SP21	432	6	92	75	83	100	82	82	Final Site specific plan-	F
	432M	3	92	75	92	100	78	83		
	432DL	3	83	75	75	100	86	81		

Spring 22 Semester									
SLO1									
Course	Total	High	Low	Med	% achieve >75%	Average-Assignment	Average-Class	Assignment Type	Instructor
432DL	10	96	75	81	100	83	87	Final Site specific plan	F

SLO 1 Findings and results

For Fall 20, even though DL and M classes are indicated, due to continuing pandemic, classes were largely online. Students really struggle with math and science concepts especially in EHS 313 and EHS 457. These are harder industrial hygiene and epidemiology courses. Faculty have tried improvements in the courses and some changes in scores have improved for EHS 313. See continuous improvement Tables 4.3 for plans to be implemented for Fall 2022 in the classes (e.g., conversion tables, more videos, additional tutoring). EHS 432 saw improvements in scores. Students were specifically given more time on site-specific plans and to submit plans of hazards and controls. These plans were started earlier in the semester and student had to submit sections earlier for feedback. For EHS 311 there are also improvements in students' scores from Fall 2020 to fall 2021. Students do not have a general understanding of hazardous material exposure and the faculty realized the need to enhance students' learning on hazardous chemicals exposure route and the differentiation between acute and chronic exposure. EHS 211 will be dropped as a course this SLO to be assessed. SLO 1 does remain one of the hardest SLO in terms of achievement for students.

Table 4.2.2: SLO 2: Results-Two Year Data

Spring 2020 Semester									
SLO2									
Course	Total	High	Low	Medium	% achieve >75%	Average Assignment	Average Class	Assignment Type	Instructor
214	14	100	50	75	46	90	86	Site Specific Fire Plan	F
432	13	96	67	79	83	86	88	Site Specific Safety Plan	F
436	12	100	40	81	67	84	81	Design-wastewater system	D
498	2	100	89	94	100	94	99.7	Final portfolio	O

Fall & Spring 2021 Semesters										
SLO2										
Sem	Course	Total	High	Low	Medium	% achieve >75%	Average Assignment	Average Class	Assignment Type	Instructor
SP21	432	6	92	75	83	100	82	82	Final Site specific plan	F
	432M	3	92	75	83	100	83	83		
	432DL	3	92	75	75	100	81	81		
SP21	436	12	100	50	85	92	86	96	Chapter 10 Assignment Problem	D
	436M	3	100	85	85	100	90	95		
	436DL	9	100	50	88	89	83	96		
SP21	498DL	6	100	67	75	80	83	87	Final project/portfolio	F

Spring 22 Semester									
SLO2									
Course	Total	High	Low	Med	% achieve >75%	Average-Assignm ent	Average-Class	Assignment Type	Instructor
432DL	10	100	62	84	90	85	87	Final Site specific plan	F
436DL	8	100	50	95	88	89	98	Chapter 10 Assignment Problem 2	D
498DL	5	100	67	83	80	80	90	Final Portfolio	F

SLO 2 findings and Comments

For Fall 20, even though DL and M classes are indicated, due to continuing pandemic, classes were largely online. Spring 22, no students registered for M classes, and those were closed. EHS 214 was dropped as an assessment course. EHS 432 scores fluctuate in the percent achieving 75% or higher. Students were specifically given more time on site-specific plans and to submit plans of hazards and controls. These plans were started earlier in the semester and student had to submit sections earlier for feedback. However, the instructor is also for Spring 2022 demanding a better focus on the design aspects for the site safety plan and scoring more rigidly on this. Some student need to better design around the specifics of the product for a company and therefore tailor hazards and controls accordingly. EHS 211 will be dropped as a course this SLO is assessed in. The small numbers in EHS 498 make it hard to determine achievement. However, instructor is providing more feedback on the monthly reports that feed into the final report. EHS 436 has seen improvement in student outcomes for this SLO over the years and largely due to improved engagement by the faculty with students. Faculty also added additional problem sets and a case study on anaerobic membrane process versus other biological treatment methods. Again, see table 4.3 for continuous improvement in these courses.

Table 4.2.3: SLO 3: Results-Two Year Data

Fall 2020 Semester									
SLO3									
Course	Total	High	Low	Medium	% achieve >75%	Average Assignment	Average Class	Assignment Type	Instructor
211	14	100	0	100	92	91	91	Assignment 3 Question	O
211M	1	100	100	100	100	100	95		
211DL	6	100	100	100	100	100	88		
311	15	96	62	82	73	80	96	Chapter 4 Homework assignment	D
311M	2	82	66	74	50	74	91		
311DL	13	96	62	84	77	80	96		
313	10	100	0	80	80	66	84	Lab 3: (two students did not turn work in)	F
313M								person did not turn in work	
313DL	9	100	0	80	63	83	87		
457	10	100	0	33	10	30	78	Assignment 2 Study	O
457M	2	33	33	33	0	33	82		
457DL	8	100	0	33	13	38	78		

Fall & Spring 2021 Semesters										
SLO3										
Sem	Course	Total	High	Low	Medium	% achieve >75%	Average Assignment	Average Class	Assignment Type	Instructor
F21	311	11	100	80	98	100	96	94	Chapter 4 Homework	D
	311M	1	100	100	100	100	100	97		
	311DL	10	100	80	97	100	95	94		
F21	313	14	100.0	84	90	78	90	90	Assignment Assessed: EHS 313: Lab 2:	S
	313M	2	100.0	88		100	93	94		
	313DL	12	94.0	0	87	80	89	81		
F21	457	20	100	0	38	50	38	78	Assignment 2 Study Design	O
	457M	1	50	50	50	0	50	85		
	457DL	19	100	0	75	50	64	78		

SLO3 Findings:

For Fall 20, even though DL and M classes are indicated, due to continuing pandemic, classes were largely online. We saw improvements in SLO3 for EHS 313 with the percent achieving 75% or higher in the class. Faculty has had to spent greater time providing assistance to the students. Again, see Table 4.3 for planned improvement by faculty. EHS 457 students are still struggling, where SLO3 objective of at least 80% achieving over 75% is not being achieved, although there was some improvement from Fall 20 to Fall 21. Students need to better understand a study design in epidemiology. EHS 311 is meeting the objectives for this SLO in their homework assignment for Chapter 4 since Fall 2021. The faculty previously added additional learning content, video demonstrations and problem sets on hazardous material transportation, containment and storage.

Table 4.2.4: SLO 4: Results-Two Year Data

Spring 2020 Semester										
SLO4-Verbal										
Course	Total	High	Low	Medium	% achieve >75%	Average Assignment	Average Class	Assignment Type	Instructor	
214	14	96	83	90	100	90	86	Site Specific Fire Plan	F	
315	10	100	0	100	80	89	85.47	Final presentation	O	
498	2	100	100	100	100	100	99.7	Final presentation	O	
432	13	93	65	73	85	86	88	Site Specific Safety Plan	F	
Spring 2020 Semester										
SLO4-Written										
Course	Total	High	Low	Medium	% achieve >75%	Average Assignment	Average Class	Assignment Type	Instructor	
432	432	100	75	88	100	86	88	Site Specific Safety Plan	F	
498	498	100	100	100	100	100	99.7	Final portfolio	O	
Fall & Spring 2021 Semesters										
SLO4-Verbal										
Sem	Course	Total	High	Low	Medium	% achieve >75%	Average Assignment	Average Class	Assignment Type	Instructor
SP21	315	27	100	0		70	74	78	Final Oral presentation	O
	315M	3	98	80	98	100	92	83		
	315DL	24	100	0	89	58	68	73		
SP21	498	6	98	66		83	79	87	Final project	F
Fall & Spring 2021 Semesters										
SLO4-Written										
Sem	Course	Total	High	Low	Medium	% achieve >75%	Average Assignment	Average Class	Assignment Type	Instructor
SP21	432	6	88	63	75	50	72	82	Final Site specific plan-	F
	432M	3	88	63	75	66	69	83		
	432DL	3	75	69	69	33	75	81		
Spring 22 Semester										
SLO4-Oral										
Course	Total	High	Low	Med	% achieve >75%	Average-Assignm ent	Average-Class	Assignment Type	Instructor	
315DL	15	100	0	90	73	69	71	Final Oral Presentation	O	
432DL	10	94	76	94	100	90	87	Safety Plan-Final Project-Presentation	F	
498DL	5	100	88	94	100	95	90	Final Profolio Presentation	F	

SLO 4: Findings and Comments

This SLO is split between evaluation of written and verbal (oral) communication. For Fall 20, even though DL and M classes are indicated, due to continuing pandemic, classes were largely online. In EHS 432, there was some fluctuation from Spring 20 to Spring 22 in EHS 432, where some outcomes may be due to COVID pandemic effects (this applies across all classes).

In general, students do reasonably well in verbal and written in the senior courses of EHS 498 and EHS 432. Critical for EHS 432 was to provide examples of referencing format for federal

codes. Some students still did not make use of these resources. They can continue to make improvements in referencing and formatting for written communication. Distance learning students continue to struggle in EHS 315 with presenting and communicating toxicology concepts, which are more difficult to grasp. This challenge with toxicology concepts is also seen in their exam outcomes and overall grades in the course. See Table 4.3 for continuous improvements for these classes.

Table 4.2.5: SLO 5: Results-Two Year Data

Fall 2020 Semester										
SLO5										
Course	Total	High	Low	Med	% achieve >75%	Average Assignment	Average-Class	Assignment Type	Instructor	
220	14	100	73	90	93	89	88	Exam 2	D	
220M	2	100	73	89	92	89	92			
220DL	12	90	0	45	50	45	67			
313	10	93	0	84	80	69	84	Lab 3: (two students did not turn work in)	S	
313M	1							no work turned in		
313DL	9	93	0	85	87	81	87			
469	7	89	38	63	29	66	75	Exam 2	D	
469M	6	89	38	62	17	63	78			
469DL	1	84	84	84	100	84	58			
Fall & Spring 2021 Semesters										
SLO5										
Sem	Course	Total	High	Low	Medium	% achieve >75%	Average-Assignment	Average-Class	Assignment Type	Instructor
F21	313	14	100	83	100	100	89	85	Lab 2: Medium Flow Rate Sampling	S
	313M	2	100	100		1	1	94		
	313DL	12	100	0	84	1	86	81		
F21	469	15	100	71	86	93	86	84	Exam 2	D
	469M	1	71	71	71	0	71	96		
	469DL	14	100	75	88	100	87	83		
S21	498	6	100	88	94	94	92	87	Ethics research-track papers-written assignment	F
S21	432	6	100	88	94	100	94	82	Site Specific-Safety Plan	F
	432M	3	100	94	87.5	100	92	83		
	432DL	3	100	87.5	94	100	96	81		
Spring 22 Semester										
SLO5										
Course	Total	High	Low	Med	% achieve >75%	Average-Assignment	Average-Class	Assignment Type	Instructor	
498DL	5	100	0	91	80	73	90	New Ethics and Professionalism assign	F	
432DL	10	97	75	92	100	89	87	Safety Plan-Final Project Plan	F	

SLO 5: Finding and Comments:

For Fall 20, even though DL and M classes are indicated, due to continuing pandemic, classes were largely online. Spring 2022, M campus courses were dropped due to lack of enrollment in those courses. Students are achieving this outcomes and the program is meeting its targets here. For this SLO for EHS 432 and EHS 498, students are better understanding ethics and professionalism in the work setting and as it applies to their obligations as an EHS professional. For EHS 498 and EHS 432 new streamlined assignments were added for ethics and professionalism (track down ethics articles and answer a series of questions, and ethics and professionalism applied to a site-specific plan). Continuous improvement will continue to monitor outcomes and in particular stress contemporary ethical issues for corporations and industries. In EHS 469 from the Fall 2020 assessment, students appear to lack a general understanding of ethical requirements around ISO standards and regulation systems. Faculty has enhanced student learning on ISO standards and regulation systems through examples via video and case studies resulting in improvements. Again, see Table 4.3 for continuous improvements across all courses.

Table 4.2.6: SLO 6: Results-One Year Data

Spring 22 Semester									
SLO6									
Course	Total	High	Low	Med	% achieve >75%	Average-Assignment	Average-Class	Assignment Type	Instructor
432DL	10	100	78	94	100	93	89	Safety Plan Final-Group Presentation	F
498DL	6	100	88	90.6	100	92	90	Contract and Final Project-Roles	F
315DL	15	100	42	100	67	84	71	Cardiovascular Discussion Board	O

SLO 6: Findings and results.

This is an important student learning outcome to assess and is a newer SLO addition by ABET. COVID had significantly affected the ability to address this outcome, where group projects and meetings became more challenging. Student were reverted to research projects instead of field study for example in our field study course EHS 498 where they work with teams. For Spring 2022, the program feels like it recovered from some (not all effects) for COVID and students were again able to find field internships for EHS 498. In addition, EHS 432 the final project was assigned as a team-work project. Students performed well in both courses for team-work. Although students were asked for a team plan in EHS 432, in the future a specific team plan template will be provided to improve outcomes. In EHS 432, some students need to find more synergy when they work together, but overall students are achieving this outcome. EHS 498, students need to better recognize their role on teams in the field and describe better their relationships and supervision. For EHS 315, some students did not follow the rules on communicating with the peers in an active team discussion, where giving feedback on more challenging toxicology concepts proved more difficult. This class did have 75% attainment in team work. In the future, the program will look at assessing CM 320-Construction Safety for team-work in both EHS and CM assessments, where this is a course that students take across our CM and EHS programs.