

Assurance of Student Learning Reflection 2024-2025	
Ogden College of Science and Engineering	Department of Earth, Environmental, & Atmospheric Sciences
Undergraduate Certificate in Geographic Information Systems (#174)	
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<i>Is this an online program?</i> ☐ Yes ☒ No	Please make sure the Program Learning Outcomes listed match those in CourseLeaf. Indicate verification here ☒ Yes, they match! (If they don't match, explain on this page under Evaluation)

Instructions: For the 2024-25 assessment, we are asking you to reflect on the last three-year cycle rather than collect data. It's important to take time to look over the results from the last assessment cycle and really focus on a data-informed direction going forward. In collaboration with your assessment team and program faculty, review each submitted template from 2021-2024 and consider the following for each Program Learning Outcome, add your narrative to the template, and submit the draft to your **ASL Rep** by **May 15, 2025**.

Program Student Learning Outcome 1	
Program Student Learning Outcome	Students can demonstrate proficiency in the quantitative and qualitative spatial analysis and critical thinking through written and oral communication.
Evaluation	This Program Student Learning Outcome has changed within the last three assessment cycles. The reason for the change was due to the changing of curriculum within the first two classes. The curriculum between GISC 316 & 317, for the most part, was swapped. We made this change because we required just one course, GISC 316, for some of our majors in the department (EEAS) and both, GISC 316 & 317, in another major within EEAS. We felt strongly that the content of the original GISC 317 would be best in GISC 316 so all students were exposed to it. We have successfully made and implemented that curriculum change. The current academic year is the third year of collecting data on the change and we will be continuing to watch and analyze how these changes might impact our students. At the time of creating this document we are relatively happy with the changes and how we are assessing this Student Learning Outcome.
Measurement Instruments	Direct: Applied spatial data synthesis and analysis projects utilizing GIS technology, mapping, along with written and oral communication of processes and analysis, is now administered in GISC 316 (Geographic Information Systems I). A series of three applied projects are completed in the course demonstrating the students abilities to create data, analyze data, display and communicate their findings. All data analysis and projects completed in the course are from real-world data sets.
Criteria & Targets	Since the change in the curriculum, the average score for students for this learning outcome did drop from the old curriculum but we have seen a slight increase in the overall average scores on the three current assessments. We

	believe that continuing with this criteria is important for the program as we collect more data and have an opportunity to fully understand the impact of the curriculum changes.
Results & Conclusion	When we made the change to the new curriculum for GISC 316 we did believe that we would see an overall drop in scores but we were successful in staying within the evaluation boundary of 70% or higher for passing. We are happy to see that the overall averages are making a slight increase. Moving forward, we may add one more opportunity for judgement. Currently, there are three projects and we may be increasing that to four projects. Some curriculum changes, mainly how the students are being introduced to the software and improve their ability to navigate within, are being streamlined for faster comfort of the students with the GIS software that will allow an additional project to gauge their ability to demonstrate their proficiency in this program student learning outcome. We are also dealing with the issue of greatly increasing the number of majors that take the GIS classes/certificate, but with fewer faculty. We have been considering ways to increase the number of seats in our classes without removing rigor from the course. This is a balance at the forefront of any upcoming changes.
<u>**IMPORTANT - Plans for Next Assessment Cycle:</u>	Moving forward, we may add one more opportunity for judgement. Currently, there are three projects and we may be increasing that to four projects. Some curriculum changes, mainly how the students are being introduced to the software and grow their ability to navigate within, are being streamlined for faster comfort of the students in the GIS software. These improvements in instructional approach will allow for the addition of project to further gauge their ability to demonstrate their proficiency in this program student learning outcome. We have been working with ways to increase the number of seats in our classes without removing rigor from the course. This is a balance at the forefront of any upcoming changes. So, collectively, we will not change this learning outcome, but may add an additional project metric.

Program Student Learning Outcome 2	
Program Student Learning Outcome	Students will be able to organize GIS data and communicate effectively through mapping using accepted principles of cartographic design and spatial reference systems.
Evaluation	As state above, the first two GISC courses swapped curriculum and this second program learning outcome has been altered due to those curriculum changes. We have successfully made and implemented that curriculum change. The current academic year is the third year of collecting data on the change and we will be continuing to watch and analyze how these changes might impact our students. At the time of creating this document we are relatively happy with the changes and how we are accessing this Student Learning Outcome and the impact it is having on our students. When we made the changes to the curriculum, we had an opportunity in this course to create an individual research

	project for each student. We have had tremendous success in the quality of student projects. The students themselves are gaining confidence in conducting research along with incredible experiences at solving complex problems, not just their research question but also the stumbling blocks one goes through with applied learning and finding their own way through the unexpected obstacles. This confidence gain, we feel, greatly assists our graduates.
Measurement Instruments	Direct: Applied spatial data synthesis and analysis projects utilizing GIS technology, mapping, along with written and oral communication of processes and analysis is administered in GISC 316 & GISC 317. The students projects from GISC 316 and the applied individual research project in GISC 317 completed in these course document the students abilities to create data, analyze data, display and communicate their findings. The project in GISC 317, specifically, requires that the student articulate a research idea and how they will address it; an indication of critical thinking processes. The hands-on process of finding data and assessing its usefulness for the project, performing analyses appropriate for the project idea, analysis and data interpretation, and producing a traditional map that displays the important elements of communication and cartography are effective learning experiences and viable bases of our rubric-driven assessment. The last part of the project, that requires the student to produce a comprehensive report on how they conducted their project, in a specified format, provides a viable indicator of the students written communication skills. In summary, the current instrument that we use to measure the Student Learning Outcome for GISC317 is highly effective and pertinent to study success. All data analysis and projects completed in the course are from real-world data sets.
Criteria & Targets	We will continue to engage our students in an individual research project in GISC 317 where they work one on one with their instructor to develop and carrying out the research through to presentation.
Results & Conclusion	We do feel that this assessment has been extremely successful. We have continued to add more to this research project and want to continue on this trajectory.
<u>**IMPORTANT - Plans for Next Assessment Cycle:</u>	Next year we will implement the same research project with a possible few changes. We will add more work with some of the online apps for data collection. We may add a survey portion to the project that would allow the students to use additional applications that are now being used in the industry quite widely.

Program Student Learning Outcome 3	
Program Student Learning Outcome	Students will demonstrate proficiency in GIS project planning, design, and implementation, as well as mastery of advanced geoprocessing and modeling techniques.
Evaluation	Regarding assessment of GIS project planning and design and implementation of advanced geospatial analysis and modeling skills, the program goal has been met each academic year in GISC 417. The capstone project combines the skills presented together from the first two certificate courses, to manage, create, analyze, and interpret findings. The project is a true representation of many aspects of geospatial inquiry in which students will be engaging when hired

	into a GIS position. In 419, students learn to implement custom GIS analytical tools by working on a set of six projects to automate spatial analysis processes and geoprocessing workflows with ArcGIS ModelBuilder and Python scripting.
Measurement Instruments	1-Direct: Analysis of capstone project in GISC 417 (GIS Analysis and Modeling). A comprehensive rubric is used to evaluate the capstone project. 2- Direct: Analysis of six applied projects in GISC 419 (GIS Programming). A comprehensive rubric is used to evaluate all six projects.
Criteria & Targets	Yes, students have been successful, and we are happy with the current trends. As mentioned above in the evaluation section, students are presented with a comprehensive set of skills.
Results & Conclusion	We are happy with continuing to assess this learning outcome through the projects completed in the final two GISC courses, GISC 417 and GISC 419. As we add teaching materials focused on additional advanced GISC skills and applications, we will adapt existing rubrics to ensure those, too, are evaluated. Otherwise, the projects of GISC 417 and GISC 419 are effective tools for students demonstrating proficiency in GIS project planning, design, and implementation, as well as mastery of advanced geoprocessing and modeling techniques.
<u>**IMPORTANT - Plans for Next Assessment Cycle:</u>	The GISC certificate program went through the Academic Program Review this academic year. As a result, we are in the process of putting together an advisory board to assist with curriculum that best reflects the industry standards. We are no longer teaching a GIS major although we do have many additional courses in our catalog. We need to potentially reconfigure the curriculum in these two courses, GISC 417 & 419, with some of the content from the courses we are currently only teaching as independent studies, to provide our students a broader understanding of the advance GIS skills. We are confident students are gaining appropriate GIS skills but are effectively trying to incorporate even more at the recommendation of recent graduates and industrial partners. As those skills are incorporate, we will adapt project rubrics to ensure we are also evaluating proficiency in those skills.

To add more outcomes, if needed, select the table above and copy & paste below.