

**NORTH CAROLINA AGRICULTURAL AND TECHNICAL
STATE UNIVERSITY**

**Program Assessment and Improvement Report
Department of Built Environment
Bachelor of Science in Geomatics**

There are thirteen full-time tenure and non-tenured faculty (CORE) that deliver 3 programs (and Certificate in OSH) in the Built Environment Department. Specifically, there are now three full-time faculty with one being a tenure track (CORE) position that deliver the **B.S. in Geomatics Program**. Located in the College of Science and Technology, the Geomatics program follows university's guidelines for assessing educational programs.

Student Learning Outcomes

1. **Communication Skills.** Students completing the B.S. degree program in Geomatics will exhibit effective communication skills (written, oral, graphic, and interpersonal) appropriate for professionals in this field of study at the bachelor's level.
2. **Critical Thinking Skills.** Students completing the B.S. degree program in Geomatics will effectively apply knowledge of mathematics, science, and applied science to demonstrate analytical problem-solving skills appropriate for professionals in this field of study at the bachelor's level.
3. **Disciplinary Expertise.** Students completing the B.S. degree program in Geomatics will demonstrate a level of discipline-specific expertise (knowledge, skills, and professionalism) appropriate for professionals in this field of study at the bachelor's level.
4. **Research/Creative Engagement.** Students completing the B.S. degree program in Geomatics will demonstrate ability to engage productively in the review and conduct of disciplinary research and creative professional activity appropriate for professionals in this field of study at the bachelor's level.

ASSESSMENT MEASURES

At least 80% of our students will receive a 4 or better on a 1 to 5 assessment rubric with 4 being above proficient. While improvements were made continuously based on student achievement data, the instruments themselves never helped us spot needed improvements. Therefore, the program will redesign the student learning outcome assessments.

ASSESSMENT RESULTS

The assessment results are presented in Tables 1-4 below, for each of the four learning outcomes.

Table 1. Communication Skills. Students completing the BS degree program in Geomatics will exhibit effective communication skills (written, oral, graphic, and interpersonal) appropriate for professionals in this field of study at the bachelor's level.

Method of Assessment	Year	Results of Assessment	Use of Assessment Results for Improvement
<p>Students will be measured on their ability to communicate effectively by written and oral communications, technical reports, and drawings. This will be evaluated in either the fall or the spring semester in GEOM 496 or 499. Both are capstone courses and the evaluations are completed by the Geomatics Advisory Committee at the student presentation as well as Built Environment faculty and other students.</p> <p>These require the students to prepare a formal report discussing property boundaries and other items.</p>	2016-2017	2016 – 2017 All 11 evaluators scored the students with either a 4 or 5 for the oral presentations. 10 out of 11 scored with 4's or 5's with one scoring a 3.0. the average on the written report was a 4.36 out of 5.0 (100% met)	Routinely all of our students meet the target. However, due to the small number of students in the capstone courses, one student not achieving this course will swing the percentage to not meeting the target. Looking back on these previous years in the cycle, we know we need to redesign our assessments so they are able to detect needed improvements mathematically. No changes necessary.
	2017-2018	2 out of 2 students exceeded the threshold on the rubric. The target was met (100% met)	No changes necessary.
	2018-2019	5 out of 6 students met or exceeded achieving a 4.0 or higher. Target met. Overall average was 93% (84% met)	Target considered met with one student not performing at an acceptable level. This semester the practice rehearsal was recorded, and the students watched it immediately and completed a critique of themselves to improve. Presentations flow better with this approach. Also, the faculty responsible for the course critiques the report at multiple times throughout the semester and this definitely impacts the final product.
	Fall 2019	4 out of 4 students performed at or above a 3.0 out of 4.0 Target met (100%).	Even though the targets were met, the capstone along with courses leading up to that are continuously assessed for improvements that can be made that would impact the capstone course.
	Fall 2020	The individual scores varied from 4.0 to 2.33 on the both the written and oral presentation for an overall score of 3.67 out of 4.0 or 92 %.	The final report by the seniors was excellent with the team meeting all the requirements of a site feasibility study. No change at this time.

Table 2: Critical Thinking Skills. Students completing the BS degree program in Geomatics will effectively apply knowledge of mathematics, science, and applied science to demonstrate analytical problem-solving skills appropriate for professionals in this field of study at the bachelor's level.

Method of Assessment	Year	Result of Assessment	Use of Results for Improvement
<p>Graduating Geomatics students win GEOM 499 Capstone Design (4-credits) will be able to design an effective stormwater plan for a residential subdivision that meets state and local requirements.</p> <p>2020-2021- Students were measured on their Final Project in GEOM 499 Senior Project II.</p>	2016-2017	11 out of 12 evaluators scored the students with either 4's or 5's with one evaluator scoring the students with a 3.0. Target met (94 % met).	The final capstone is a 4- hour course and majority of our students are part-time with full-time jobs. Our main challenge is keeping them on task during the semester. The weekly meetings are done using Collaborate or Skype as the sharing of screens must be done. Overall, this is successful but challenging. The students routinely seem to forget their educational exercises in both Hydraulics and Hydrology courses. Coordination with faculty to enhance retention of material.
	2017-2018	2 out of 2 students exceeded the threshold on the rubric. The target was met (100% met).	No changes needed to be made.
	2018-2019	5 out of 6 students met or exceeded achieving a 4.0 or higher. Target met. Overall average was 93% (84% met)	Only once in recent years has a student performed poorly on all aspects of the stormwater design and this lowered the overall performance for that year. The documentation of the final design was difficult to follow, and the process and calculations were not well organized. Emphasis on better documentation and reports were emphasized strengthened in GEOM 366 and 367 this past year with samples given of professional reports and more instruction as to acceptable format. This showed improvement in the most recent year. Another item that we have noted needs strengthening is the actual layout (regulations, acceptable standards, locations) of stormwater drainage on streets needs to be strengthened. This will be incorporated in both GEOM 366 and GEOM 350 Subdivision Design.
	Fall 2019	Not assessed	
	Spring 2021	Only 75% of the students met the 90% target.	There were four students in the course. One student failing to participate, the overall score was 86%, which is less than the targeted goal of 90%. As this is a small class and the three who participated did well, no changes are recommended.

Table 3: Disciplinary Expertise. Students completing the BS degree program in Geomatics will demonstrate a level of discipline-specific expertise (knowledge, skills, and professionalism) appropriate for professionals in this field of study at the bachelor's level.

Method of Assessment	Year	Result of Assessment	Use of Results for Improvement
<p>The Geomatics students' project in GEOM 496 Capstone requires an in-depth analysis/research into project property and all contiguous landowners. The data from this research must be analyzed and interpreted for the locations of property boundaries at a professional level.</p> <p>Rubrics are employed for this and we expect that 90% students will receive a 4.0 / 5.0 on the rubric evaluations.</p>	2016-2017	On 3 out of 4 rubrics, the students received all 5.0's. Target met (94% met).	One of our strong suits in the program is our depth of legal property boundary and law courses. Students had issues overall with the process of deed research as well as junior-senior rights. More emphasis on junior/senior rights in GEOM 470 Boundary and Legal as well as strengthening the process of deed research in GEOM 271 would be implemented.
	2017-2018	2 out of 2 students exceeded the threshold on the rubric. The target was met (100% met).	All students met the established target due to modifications in two existing courses the previous year.
	2018-2019	5 out of 6 students met or exceeded achieving a 4.0 or higher. Target met. Overall average was 93% (84% met).	Faculty have noted that some aspects of property research needs strengthened. More emphasis on the entire process of deed research and junior and senior rights will be continued in GEOM 271 Land Survey Systems and in GEOM 470 Legal and Boundary. It has lessened the questions in GEOM 496 as the students complete the property research.
	Fall 2019	4 out of 4 students received above a 4.0 out of 5 for this area. Target met (100% met).	More emphasis in the two photogrammetry courses GEOM 320 and 420 needs to be placed on the processing of the data. Modifications to the courses will be made this coming year. With the expansion of the topics in the FS exam starting in July 2020, this would be considered a necessity as well for the students to be successful in those topics.
	Fall 2020	The individual scores varied from 4.0 to 2.75 for an overall score of 3.69 out of 4.0 or 92 %.	This semester the course consisted of 4 students. Three students performed very well in the class and the final report and prepared final plat.

Table 4: Research/Creative Engagement. Students completing the B.S. degree program in Geomatics will demonstrate ability to engage productively in the review and conduct of disciplinary research and creative professional activity appropriate for professionals in this field of study at the bachelor's level.

Method of Assessment	Year	Result of Assessment	Use of Results for Improvement
The students in GEOM 499 Capstone will be able to complete the design of a residential subdivision to meet the local and state land development standards during the semester and the Geomatics Advisory Committee at their Spring Meeting. Both groups look at the elements of the design and the students understanding of the complex standards that must be met. Rubrics are developed for these and the target is 90% of the students will receive a 4.0 / 5.0 on the rubric evaluations.	2016-2017	11 out of 12 evaluators scored the students with either 4's or 5's. One scored with a 3.0. Target met (94% met).	The faculty will continue to monitor this area to make sure that we are including the latest guidelines for development.
	2017-2018	2 out of 2 students exceeded the threshold on the rubric. The target was met (100% met).	No modifications required.
	2018-2019	5 out of 6 students met or exceeded a 4.0 out of 5.0. Consider target met (84% met)	The faculty will continue to involve undergrads in more research opportunities outside the classroom
	Fall 2019	4 out of 4 students met the target (100 % met)	As was recommended in last year's report, a project site was selected that offered more accessibility, better terrain, and size. This demonstrated marked improvement by the evaluation of both the Geomatics faculty and the Geomatics Advisory Board. All the seniors performed well with the exception of one. Overall design showed growth with a marked improvement in the use of Civil 3D. The course instructor believes this to be a result of additional exercises in GEOM 307/317 as was recommend last year. The faculty will continue to strengthen GEOM 307/217.
	Spring 2021	The overall average was 86%.	There were four students in the course. One student failing to participate, the overall score was 86%, which is less than the targeted goal of 90%. As this is a small class and the three who participated did well, no changes are recommended.

SUMMARY

The goal of achieving ABET accreditation was paramount for the Geomatics program. The Geomatics program received accreditation from ABET ANSAC on August 2, 2017. This was retroactive for the two previous years and will continue through September 30, 2023. Recently ABET modified their student learning outcomes from the traditional (a) through (k) to (1) through (6). Our courses and their respective syllabi reflect these changes. The Geomatics program recently was mentioned in the 2020 Best Value Colleges rankings from the Guide to Online Schools that the Geomatics program was ranked third as the 2020 Best Online Bachelor's Geographic Information Systems Degrees #3 and the 2020 Most Affordable Online Bachelor's Geographic Information Systems Degrees #9. The links are listed below.

- [2020 Best Online Bachelor's Geographic Information Systems Degrees: #3](#)
- [2020 Most Affordable Online Bachelor's Geographic Information Systems Degrees: #9](#)

The overall program mission of the Geomatics program at North Carolina Agricultural and Technical State University is to prepare men and women in the scientific, supervisory, and managerial areas required to advance in the Geomatics profession. The focus of the BS Geomatics is to prepare students academically to pass the first national exam for licensure. With their foundation in academics and practical experience gained in the industry, they will then be able to achieve licensure as a Professional Surveyor throughout the country. The combination of academics and experience will ensure that our graduates will achieve professional status and be able to adapt to the rapidly changing technologies in the Geomatics arena.

Department Chair-Alesia Ferguson

Date
