NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIVERSITY

Program Assessment and Improvement Report
Department of Computer Systems Technology
Bachelor of Science in Electronic Technology

Six full-time (3 tenured, 2 tenure track, and I non-tenure track) and thirteen part-time Computer Systems Technology faculty deliver the BS in Electronic Technology program. Located in the College of Science and Technology, it follows University's guidelines for assessing educational programs.

1. Expected Outcomes for the Educational Program and Its Student Learning Outcomes

a. Program Outcomes

The BS program in Electronic Technology will retain its accreditation by ABET. The Program's accreditation was reaffirmed in 2017 for a seven-year cycle.

Subordinate Program Outcomes Contributing to Reaccreditation:

A) Achieve excellence in academic effectiveness and efficiency.

B) Strengthen laboratory facilities and equipment.

b. Student Learning Outcomes

(1) Communication: Students completing this degree program will exhibit effective communication skills (written, oral, and interpersonal) appropriate for professionals in this field of study.

(2) Critical Thinking: Students completing this degree program will effectively use quantitative and qualitative analytical problem-solving skills appropriate for professionals in this field of study.

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

(4) Research/Creativity: Students completing this degree program will demonstrate ability to engage productively in the review and conduct of disciplinary research appropriate for professionals in this field of study.

2. Analysis of Expected Program Outcomes Assessment

a. Program Outcomes

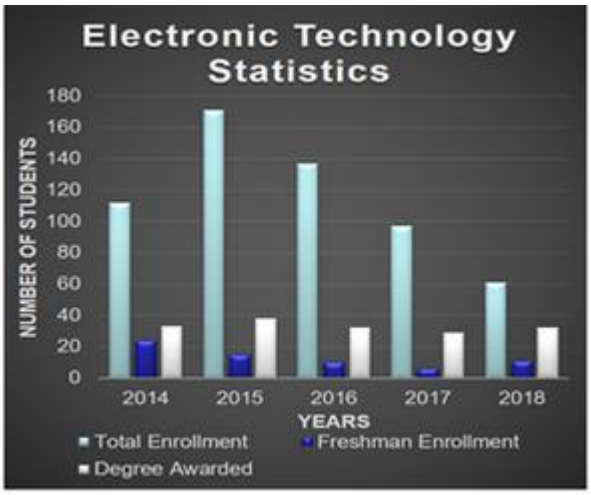
The three program outcomes for the BS in **Electronic Technology** are summarized in **Table 1**, showing the relationship between the outcomes, the assessment, the results, and the improvements made. A more detailed narrative follows the table.

Table 1: Program Outcomes, Assessments, and Improvements

Name of Program	Program Outcome	Method of Assessment	Results of Assessment	Use of Assessment Results for Improvement
BS in Electronic Technology	Achieve excellence in academic effectiveness and efficiency.	The primary measures of this outcome are enrollment and degrees awarded. Targets: Enrollment: 3% growth Annual Degree Awarded: 25 per year	**Targets not met.** **Enrollment:** 16-17 to 17-18, · 137 majors to 97 17-18 to 18-19, · 97 to 61 **Target met** Degrees Awarded 15-16: 32 degrees awarded 16-17: 29 degrees awarded 17-18: 32 degrees awarded	**To improve enrollment**, even with target met: · Create ET recruitment committee · Modernize our Degree Program.
	(1)(d) The BS in Electronic Technology will strengthen laboratory facilities and equipment.	Modernize Classrooms.	Having added about $200K worth of powerful computers, installed in two laboratories and classrooms there are no longer any student complaints.	**Target met.**

Over the past five years, as part its ongoing "*Preeminence 2023*" initiative, NC A&T has undergone restructuring of its academic units to increase competitiveness and to attract world-class educators, scholars and athletes. The overwhelming success of this initiative has improved

almost every aspect of our university, with enrollment growth arguably the most affected. For the past three years, we have been the largest HBCU in the country. However, in contrast to this record-breaking enrollment trend, the electronic technology program's enrollment has waned. Our statistical analysis forecasts a sharp decline in degrees awarded if we do not bolster recruitment and retention activities. The chart below shows enrollment trends since 2014. Although we have seen a modest increase from 2017-18 in freshman enrollment, this is offset by the 66 percent 1-2 year retention rates.



Enrollment and Graduation Data for the ET Degree Programs

Academic Semester	**Fall 2014**	**Fall 2015**	**Fall 2016**	**Fall 2017**	**Fall 2018**
ET Enrollment Trend	112	171	137	97	61

Academic Year	**2013-2014**	**2014-2015**	**2015-2017**	**2016-2017**	**2017-2018**
ET Degrees Awarded	33	38	32	29	32

b. Student Learning Outcomes

The four student learning outcomes for the BS in Electronic Technology program are summarized in Table 2, showing the relationship between the outcomes, the assessment results, and the improvements made. More detailed narrative follows the table.

Table 2. Student Learning Outcomes, Assessments, and Improvements

Name of Program	Program Outcome	Method of Assessment	Results of Assessment	Use of Assessment Results for Improvement
	SLO 1: Students completing this degree program will exhibit	Direct Measurement Key Assessment: Senior	2017: Target Met CST 499 Senior Capstone N=30 Written: 77.5% proficient	In 2017, we met our performance goals. As a result we increase the proficiency metric to 80%

BS in Electronic Technology	effective communication skills appropriate for professionals in this field of study.	Capstone Final Project Report Measurement: rubric Target 16-18: 75% Target 18-19: 80%	2018: Target Not Met CST 499 Senior Capstone N=30 Written: 76% proficient 2019: Target Met CST Senior Capstone N=21 Written: 85% proficient The primary measure for this outcome was written case analysis embedded in CST 499 (Senior Capstone) required by the electronic technology program and a formal oral presentation embedded in the same course.	in 2018. Action Plan: The target achievement was not met in 2018. The recommendation for the course was to increase the number of journal and status reports to focus on smaller concepts and developing technical reports/designs that accurately capture and communicate concepts with a smaller scope.. In 2019, the students performed well on the final project report have only 4 out of 21 not meet the 80% achievement mark.
	SLO 2: Students will be able to demonstrate critical thinking skills in the context of the discipline.	Direct Measurement Key Assessment: Master the Mainframe and Senior Project Presentation Measurement: rubric Target 16-18: 75% Target 18-19: 80%	2017: Target Met CST 340 Mainframe N=16 Problem Solving: 81.25% proficient 2018: Target Met CST 499 Senior Capstone N=30 Problem Solving: 76% proficient 2019: Target Met CST 499 Senior Capstone N=21 Problem Solving: 80% proficient The primary measure for this outcome was written case analysis embedded in CST 499 (Senior Capstone) required by the electronic technology program and a formal oral presentation embedded in the same course.	In 2017, we met our performance goals. As a result we increased the proficiency metric to 80% in 2018 and changed the assessed course to CST 499. The findings are expected. Students in our program are given team projects and presentations in multiple courses. Our design projects and presentations allow the students to demonstrate effective communication, critical thinking, problem solving, creativity, and logical reasoning. We require our students to implement current and prior course material into their project to demonstrate the depth and breath of their technical expertise in their discipline.

				In 2019, the students performed well on the final project report have only 3 out of 21 not meet the 80% achievement mark.
	SLO 3: Students completing this degree program will demonstrate a level of discipline-specific expertise (knowledge, skills, and professionalism) appropriate for professionals in this field of study.	Direct Measurement Key Assessment: Hackathon Project and Mock Lesson assignments Measurement: rubric Target 16-18: 75% Target 18-19: 80%	2017: Target Met CST 313 N=29 Knowledge and Competence: 77.5% proficient 2018: Target Met CST 460 N=38 Knowledge and Competence: 76% proficient 2019: Target Met CST 460 N=21 Knowledge and Competence: 80% proficient The primary measure for this outcome was written case analysis embedded in CST 460 required by the electronic technology program and a formal oral presentation embedded in the same course.	In 2017, we met our performance goals. As a result we increased the proficiency metric to 80% in 2018 and changed the assessed course to CST 460. To help the students meet standards the project will be broken into smaller pieces with quality checks for each stage of the project. Also, adding more lectures covering service oriented solutions should help the student better understand the implementation of such solutions to enterprise systems. In 2019, the students performed well on the final project report have only 4 out of 21 not meet the 80% achievement mark.
	SLO 4: Students completing this degree program will demonstrate ability to engage productively in the review and conduct of disciplinary research appropriate for professionals in this field of study.	Direct Measurement Key Assessment: Mock Lesson assignments Measurement: rubric Target 16-18: 75% Target 18-19: 80%	2017: Target Met CST 460 N=28 Research and Creativity: 85% proficient 2018: Target Not Met CST 460 N=38 Research and Creativity: 40% proficient 2019: Target Met CST 460 N=21 Research and Creativity: 80% proficient	For the next semester, we will implement a pre-screening phase to give more feedback to the students prior to submitting their project. Details and higher order thinking will be screened in this phase.

		The primary measure for this outcome was written case analysis embedded in CST 460 required by the electronic technology program and a formal oral presentation embedded in the same course.	

(1) **Communication:** Students completing this degree program will exhibit effective communication skills appropriate for professionals in this field of study.

The key assessment for this direct measurement was the student's ability to deliver college level documentation of end to end project work throughout the semester. Proficiency in this area will be assessed by the final report grade. It was measured using a four-point rubric based on the performance one would expect of a first-year design professional on the job, with a 3 representing proficient. In 2018, the proficiency target was not met. Notice the target proficiency was increased to 80% in 2018. The action plan for 2018 was to increase the number of journal and status reports to focus on smaller concepts and developing technical reports/designs that accurately capture and communicate concepts with a smaller scope. In 2019, the students performed well on the final project report have only 4 out of 21 not meet the 80% achievement mark. The data in Table 3 indicates the performance.

Table 3: Performance in Communication — Percentage at Target

Academic Year	Proficiency Target	Communication
2016-2017	**75%**	**77%**
2017-2018	**80%**	**75%**
2018-2019	**80%**	**85%**

(2) **Critical Thinking:** Students completing this degree program will effectively use quantitative and qualitative analytical problem-solving skills appropriate for professionals in this field of study.

The key assessment for this direct measurement was the student's ability to solve problems as reflected in the design project in the capstone portfolio. Proficiency in this area will be assessed by earning 80% or higher on the final project in CST 499 Capstone Experience. It was measured using a four-point rubric based on the performance one would expect of a first-year electronic technologist professional on the job, with a 3 representing proficient. The proficiency target was met for 2016-2019. Notice the target proficiency was increased to 80% in 2018. The data in Table 4 indicates the performance.

Table 4: Performance in Critical Thinking —Percentage at Target

Academic Year	Proficiency Target	Critical Thinking
2016-2017	75%	81%
2017-2018	75%	76%
2018-2019	80%	80%
2019-2020	80%	

(3) **Disciplinary Expertise:** Students completing this degree program will demonstrate a level of discipline-specific expertise (knowledge, skills, and professionalism) appropriate for professionals in this field of study.

The key assessment for this direct measurement was in 2017 in the CST 313 course, this outcome is measured using a Final Design Project which will be used to assess Disciplinary Expertise. Proficiency in this area will be assessed by the Final Design Project grade, project demonstration, and a graded rubric. It was measured using a four-point rubric based on the performance one would expect of a first-year electronic technologist professional on the job, with a 3 representing proficient.

After 2018, the CST 460 course was used for this assessment and this outcome is measured using a Mock Lesson assignment which will be used to assess Disciplinary Expertise. Proficiency in this area will be assessed by a Mock Lesson report, PowerPoint slides, and a graded rubric. It was measured using a four-point rubric based on the performance one would expect of a first-year electronic technologist professional on the job, with a 3 representing proficient. The proficiency target was met for 2016-2019. Notice the target proficiency was increased to 80% in 2018. The data in Table 5 indicates the performance.

Table 5: Performance in Disciplinary Expertise —Percentage at Target

SLO	2016-17	2017-18	2018-19	2019-20
SLO 3: Students completing this degree program will demonstrate a level of discipline-specific expertise (knowledge, skills, and professionalism) appropriate for professionals in this field of study.	**CST 313 - 77%** **CST 460 - 85%**	**CST 313 - 77%** **CST 460 - 85%**	**CST 313 - 60%** **CST 460 - 38.5%**	**CST 313 - TBD** **CST 460 - 32%**

(4) Research and Creativity: Students completing this degree program will demonstrate ability to engage productively in the review and conduct of disciplinary research appropriate for professionals in this field of study.

The key assessment for this direct measurement was the student's ability to solve problems as reflected in the design project in the capstone portfolio. Proficiency in this area will be assessed by earning 80% or higher on their Research Design Project in CST 460 System Integration and Architecture. It was measured using a four-point rubric based on the performance one would expect of a first-year electronic technologist professional on the job, with a 3 representing proficient. The proficiency target was met for 2016-2019. Notice the target proficiency was increased to 80% in 2018. The data in Table 4 indicates the performance.

This outcome is measured using a Research Design Project which will be used to assess Research and Creative Engagement in the CST 460 course. The data is collected through submission of the Research Design project report, PowerPoint slides, and a graded rubric. The data in Table 6 indicates the performance.

Table 6: Performance SLO4

SLO	2016-17	2017-18	2018-19	2019-20
SLO 4: Students completing this degree program will demonstrate ability to engage productively in the review and conduct of disciplinary research appropriate for professionals in this field of study.	**85%**	**85%**	**38.5%**	**32%**

3. Evidence of Program and SLO Improvements Using the Results of the Assessment (Closing the Loop)

a. Program Outcomes for the BS in Electronics Technology (Closing the Loop)

1. The program enrollment will increase each year with a goal of 200 students in the department by 2020.
    a. Assessment Procedures, Responsible Person, and Performance Target: To assess this outcome, we will obtain data from the Office of Institutional Research. Dr. Zeng will obtain these data from Institutional Research and summarize the findings.
2. The number of degrees awarded each year will increase with a goal of graduating 35 students per year by the year 2020.

a. University Program Goal: Program Contributions to the Research and Community Engagement. This degree program will contribute appropriately to intellectual climate and creative exchange, professionalism, civic engagement, inclusiveness, cultural awareness, and respect for diversity.

b. Student Learning Outcomes for the BS in Electronics Technology (Closing the Loop)

1. ***Communication:*** Graduating students will be able to speak clearly and accurately about design related content.

   Students performed as expected and averaged over 80%. The students performed well on the final project report have only 4 out of 21 not meet the 80% achievement mark. By allowing students to use the university writing center to help their final reports should reinforce fundamental professional writing skills. The goal is to have all students score 80 or higher on assignment. Students will be requested to have the final report reviewed by the university writing center before it is submitted. All Students will meet achievement targets.

   - In 2017, we met our performance goals. As a result we increase the proficiency metric to 80% in 2018.
     i. Action Plan: The target achievement was not met in 2018. The recommendation for the course was to increase the number of journal and status reports to focus on smaller concepts and developing technical reports/designs that accurately capture and communicate concepts with a smaller scope.
   - In 2019, the students performed well on the final project report have only 4 out of 21 not meet the 80% achievement mark.

   CST 499: Senior Capstone Experience Goals and Measurements - a successful outcome is 80% of the students will earn 80% or higher on the rubric for the Final Project Report for SLO 1 and the Final Project for SLO 2 for review years 2018-19/2019-20. For review years 2017-2018 a successful outcome is 75% of the students will earn 75% or higher for the same assessment items.

   SLO 1: Year - Target/Goal - Outcome:
   - 2016-17 - N/A
   - 2017-18 - 77.5%/75% - met
   - 2018-19 - 76%/80% - not met
   - 2019-20 - 85%/80% - met

2. ***Critical Thinking:*** Graduating students will be able to solve technical problems.

   The findings are expected. Students in our program are given team projects and presentations in multiple courses. Our design projects and presentations allow the students to demonstrate effective communication, critical thinking, problem

solving, creativity, and logical reasoning. We require our students to implement current and prior course material into their project to demonstrate the depth and breath of their technical expertise in their discipline.

All Students will meet achievement targets. The students performed well on the final project report have only 3 out of 21 not meet the 80% achievement mark. I will substitute some of the journal reports with status reports to assess how each team is progressing with the project. The goal is to have all students score 80 or higher on assignment. Students will substitute some journal reports with status reports. All Students will meet achievement targets.

- In 2017, we met our performance goals. As a result we increased the proficiency metric to 80% in 2018 and changed the assessed course to CST 499.
- The findings are expected. Students in our program are given team projects and presentations in multiple courses. Our design projects and presentations allow the students to demonstrate effective communication, critical thinking, problem solving, creativity, and logical reasoning. We require our students to implement current and prior course material into their project to demonstrate the depth and breath of their technical expertise in their discipline.
- In 2019, the students performed well on the final project report have only 3 out of 21 not meet the 80% achievement mark.

CST 499: Senior Capstone Experience Goals and Measurements - a successful outcome is 80% of the students will earn 80% or higher on the rubric for the Final Project Report for SLO 1 and the Final Project for SLO 2 for review years 2018-19/2019-20. For review years 2017-2018 a successful outcome is 75% of the students will earn 75% or higher for the same assessment items.

SLO 2: Year - Target/Goal - Outcome:

- 2016-17 - N/A
- 2017-18 - 81.25/75% - met
- 2018-19 - 76%/75% - not met
- 2019-20 - 80%/80% - not met

3. ***Disciplinary Expertise:*** Graduating students will be able to apply the principles and elements of design.

   The 2018 data report contains the rubric scores for SLO-3 for all 39 students. The data report shows that 15 of 39 students scored at 80% or above. This is 38.5% of the population. The SLO targets were met in the 2017 review with a lower target benchmark. With the new higher target, this finding is expected.

To help the students meet targets for 2019 the project will be broken into smaller pieces with quality checks for each stage of the project. Also, adding more lectures covering service oriented solutions should help the student better understand the implementation of such solutions to enterprise systems.

The project will be divided into 5 parts, instead of 3 assignments. Each of the 5 parts will be attached to a separate lecture(s) to focus on that section specifically. Target will be met.

- In 2017, we met our performance goals. As a result we increased the proficiency metric to 80% in 2018 and changed the assessed course to CST 460.
- To help the students meet standards the project will be broken into smaller pieces with quality checks for each stage of the project. Also, adding more lectures covering service oriented solutions should help the student better understand the implementation of such solutions to enterprise systems.
- In 2019, the students performed well on the final project report have only 4 out of 21 not meet the 80% achievement mark.

CST 313: Applied Hardware and Software Systems I Goals and Measurements - a successful outcome is 80% of the students will earn 80% or higher on the rubric for review years 2018-19/ 2019-20 on the Final Design for SLO 3. For review years 2016-17/2017-18, a successful outcome was an overall class average score of 75 % or higher (3.0/4.0) on the rubric for the Research Design Project.

SLO 3: Year - Target/Goal - Outcome:

- 2016-17 - 77%/75% - met
- 2017-18 -77%/75% - met
- 2018-19 - 60%/80% - not met
- 2019-20 - TBD%/80% - TBD

CST 460: System Integration and Architecture Goals and Measurements - a successful outcome is 80% of the students will earn 80% or higher on the rubric for review years 2018-19/ 2019-20 on the Mock Lesson for SLO 3 and the Research Design Project for SLO 4. For review years 2016-17/2017-18, a successful outcome was an overall class average score of 3.0/4.0 (75% or higher) on the rubric for the Research Design Project.

SLO 3: Year - Target/Goal - Outcome:

- 2016-17 - N/A
- 2017-18 - N/A
- 2018-19 - 38.5%/80% - not met
- 2019-20 - 32%/80% - not met

4. ***Research/Creativity:*** Graduating students will be able to design a true innovation based on research and development.

   The 2018 data report contains the rubric scores for SLO-4 for all 39 students. The data report shows that 15 of 39 students scored at 80% or above. This is 38.5% of the population. The SLO targets were met in the 2017 review with a lower target benchmark. With the new higher target, this finding is expected.

   To help the students meet the new target, the project will be broken into smaller pieces with quality checks for each stage of the project. Also, adding more lectures covering service oriented solutions should help the student better understand the implementation of such solutions to enterprise systems.

   The project will be divided into 5 parts, instead of 3 assignments. Each of the 5 parts will be attached to a separate lecture(s) to focus on that section specifically. Target will be met.

   - For the next semester, we will implement a pre-screening phase to give more feedback to the students prior to submitting their project. Details and higher order thinking will be screened in this phase.

   CST 460: System Integration and Architecture Goals and Measurements - a successful outcome is 80% of the students will earn 80% or higher on the rubric for review years 2018-19/ 2019-20 on the Mock Lesson for SLO 3 and the Research Design Project for SLO 4. For review years 2016-17/2017-18, a successful outcome was an overall class average score of 3.0/4.0 (75% or higher) on the rubric for the Research Design Project.

   SLO 4: Year - Target/Goal - Outcome:
   - 2016-17 - 85%/75% - met
   - 2017-18 - 85%/75% - met
   - 2018-19 - 38.5%/80% - not met
   - 2019-20 - 32%/80% - not met