

Electrical Engineering Technology Canino School of Engineering Technology 2017 Assessment Report

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What was assessed

Program Student Learning Outcomes (PSLO)

- *PSLO 1 – Communication Skills*

The category of communication skills requires students to demonstrate competency in both oral and written expression, including a basic understanding of discourse contexts and appropriate use of style and necessary writing technologies.

- *PSLO 2 – Critical Thinking*

The category of critical thinking requires students to demonstrate competency in formulating conclusions as a result of exploration, evaluation, and analysis. Students will explore, evaluate, and analyze objects, subjects, and phenomena.



ABET CRITERION 3 – Student Outcomes Satisfied in Assessment

COMMUNICATION SKILLS – ABET (3g)

(g) an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.



Critical Thinking – ABET (3a, 3b, 3c, 3d)

- (a) an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
- (b) an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
- (c) an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;
- (d) an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;



Where Outcomes Assessed

PSLO 1 - Communication Skills

- *ELEC477 – Capstone Project (Spring 2017)*
- *SOET377- Engineering Ethics (Fall 2017)*

PSLO 2- Critical Thinking

- *ELEC231-Electronic Circuits (Fall 2017)*
- *ELEC101-Electric Circuits I (Fall 2017)*



How Communication Skills Assessment is Accomplished in SOET 377-Engineering Ethics

- Case Studies Analysis
- Oral Presentations
- Research Papers

Performance measurements was based on content, context, organization, sources, and knowledge of material .

Moral issues and respect in code of ethics measured through case studies assignment. 70% of students are expected to score 70% or higher on case studies assignment. Students will demonstrate the knowledge of trust and engineering reliability and respect for diversity through case studies assignments.

Term papers that research international engineering professional code of ethics as compared to the United States of America, and PowerPoint presentation. 70% of students are expected to score 70% or higher for both term paper and PowerPoint presentation.

- Total number of students in the course : 22



How Communication Skills Assessment is Accomplished in ELEC477- Capstone Project

- Oral Presentations
- Research Papers

Performance measurements was based on content, context, organization, sources, and knowledge of material.

Each student is evaluated on oral communication during presentation, and quality of the project report paper.

The paper must be single space 10 pages or more is required, and it should be based on the project. Target: 70% of students are expected to score 70% or better for oral communication and project paper.

- Total number of students in the course: 7



Assessment results:

- *PSLO 1 - Communication Skills*

SOET 377-Engineering Ethics

Summary of Findings: 100% of students scored 90% or higher on the final research paper where students had to compare Engineering Code of Ethics in specific engineering field in United States, to another country of their choice. Students performance exceeded the target, and therefore there will be no changes in the way Engineering Ethics course is taught.

ELEC 477-Capstone Project

Summary of Findings: 80% of students scored 80% or higher for oral and written communications. Target Achievement: Exceeded



How Critical Thinking Assessment is Accomplished in ELEC 231-Electronic Circuits

- 8-Laboratory Projects
- 2-Laboratory Tests
- 2-Tests
- Midterm Exam
- Final Exam

Performance measurements was based on critical analysis, problem solving, and conclusions.

- Students will be tested on how to use laboratory equipment to solve specific problem. Each student will build and perform measurements in current and voltage, and compare the measurements to the calculated results. 60% of students are expected to score 60% or better on this laboratory test.



How Critical Thinking Assessment is Accomplished in ELEC 231- Electronic Circuits - Continue

- Students will analyze and perform calculation on Power Supply, Diodes, Filters, Zener Diodes, and Clipper circuits on a test. 60% of the students are expected to score 60% or higher on the test.
- Students will perform calculations on BJT circuits, BJT Bias circuits, and BJT amplifiers on a test. 60% of the students are expected to score 60% or higher on the test.
- Students will analyze and perform calculations on FET amplifiers on a test. 60% of students are expected to score 60% or higher on the test.
- Total number of students in the course: 12



Assessment results:

- *PSLO-2 Critical Thinking*

ELEC 231 –Electronic Circuits

Summary of Findings: 80% of students scored above 60% on the lab test.

This performance indicator shows that target was exceeded.

Performance indicators:

On this test students were asked to build a voltage divider bias circuit, and measure various voltages and currents.

2% of students failed to measure the base current of the transistor correctly.

2% of students failed to measure the emitter voltage of the transistor correctly.

1% of students failed to measure the emitter voltage correctly.

2% of students failed to measure the collector current correctly

1% of students failed to measure the collector voltage correctly



Assessment results continue

ELEC 231 –Electronic Circuits

Summary of Findings:88% of students scored above 70% on the test.

Performance indication:

10% of students either received partial credit or missed question #2 on the test.

This question was about diode clipper circuit calculation and output waveform representation.

Summary of Findings: Overall 75% of students scored 70% or higher on the test.

Performance indication:

#1. 16% of students missed question number (3) which asked students to calculate the gate/source voltage, and drain/source voltage from E-MOSFET circuit.

#2. The expected target was met, and no improvement plan in needed.



Assessment results continue

ELEC 231 –Electronic Circuits

Summary of Findings:85% of the students who took the test scored 60% or higher which means the target was met.

Performance indicators:

(1) 5% of the students either had question #1 wrong, or received partial credit. The question was under Common Emitter Amplifier where students were asked to calculate for V_B , V_E , I_E , $r'e$, and A_v .

(2) 8% of the students either had question #2 wrong, or received partial credit. The question was under Base Bias Circuit where students were asked to calculate for I_B , V_B , and V_C .

(3) 10% of the students either had question #4 wrong, or received partial credit. The question was under Collector Feedback Bias, and students were asked to calculate for V_B , V_C , I_C , and V_{CE} .



How Critical Thinking Assessment is Accomplished in ELEC 101-Electric Circuits I

- Homework Assignments
- 2-Tests
- Midterm Exam
- Final Exam

Performance measurements was based on critical analysis, problem solving, and conclusions.

- Students will perform calculations for Energy, Power, Resistance of material, Current, Voltage, Force(Newton's), and Efficiency on a test. 70% of students are expected to score 70% or higher on the test.



How Critical Thinking Assessment is Accomplished in ELEC 101-Electric Circuits I – Continue

- Students will solve circuit problems on the test that involve capacitors in series-parallel. 70% of students are expected to score 70% or higher on the test.
 - Students will perform calculations on the test that involves inductive, and capacitive series dc circuits. 70% of students are expected to score 70% or higher on the test.
 - Students will perform dc circuit calculations on Thevenin's and Norton's on a test. 70% of students are expected to score 70% or higher on the test.
 - Students will perform calculations related to mesh analysis on a test. 70% of students are expected to score 70% or higher on the test.
- Total number of students in the course : 20



Assessment results:

- *PSLO-2 Critical Thinking*

ELEC 101 –Electric Circuits I

Summary of Findings: The performance indicator shows 80% of students scored above 70% on resistor circuits test. Overall 90% of the students scored 70% or higher on capacitive circuits test. 75% of students scored 70% or higher on capacitive/inductive circuits the test. Overall 90% of students scored 70% or higher on the test.

Performance indicator:

- (1) 20% of students either had the question on Norton's Theorem wrong on the test, or received partial credit.
- (2) 6% of students either had the question on Thevenin's Theorem wrong on the test, or received partial credit. Performance indicator shows 84% of students responded to questions related to mesh analysis correctly which is greater than the expected target (70%).



How EET program plans to improve loop closing:

- (1) For critical thinking courses, EET faculty will spend more time on topics where students did not perform very well on the test.
- (2) Students will be encouraged do more problem solving as practice and preparation for test, and use engineering tutoring lab.
- (3) Electronic Fabrication course ELEC161 will replace introduction to Engineering course ENGS101 for all EET students which will improve performance and hopefully program retention.



What resources were used or have been requested to close the loop?

- (1) EET program lost a full-time faculty four years ago, and there is a need for replacement.
- (2) Financial support for student capstone and senior project can improve project quality and professional skills. \$2500 per year is suggested.
- (3) Power laboratory does not have sufficient equipment for more than 9-students at a time.
\$50,000 is suggested for power lab equipment.
- (4) Power laboratory space is not adequate , and there is safety concern.



	SLO Outcomes	Target	Courses USED	Attainment
SLO#1	Communications Skills <ul style="list-style-type: none"> ▪ Oral ▪ Written 	70%	ELEC 477 SOET 377	EXCEEDED
SLO#2	Critical Thinking <ul style="list-style-type: none"> ▪ Critical Analysis ▪ Inquiry and Analysis ▪ Problem Solving ▪ Results 	70%	ELEC 231 ELEC 101	MET

2017- B.E.T. Graduates

Number of B.E.T. graduates : 7

Employment rate : 100%

Current number of students in the program: 35

Organizations where B.E.T graduates are employed:

- NEW YORK POWER AUTHORITY
- ALCOA
- TRC
- NOVILES



SAMPLES OF STUDENTS WORK



ELEC101A (1).pdf



ELEC101B (1).pdf



SOET377_-_PAPER_FALL2017.pdf



SOET377_-_PAPER_FALL2017A.pdf



ELEC477_Capstone_Project_2017.pdf



1st Stage of the Amplifier (A_{V1})
 2nd Stage of the Amplifier (A_{V2})
 Voltage gain in (dB),
 5V

From stage one
 $hFE R_E \geq 10 R_2$

$V_{B1} = \frac{V_{CC} R_2}{R_1 + R_2} = \frac{15 \times 12000}{59000} = \underline{\underline{3.05V}}$

$V_{E1} = V_{B1} - 0.7 = \underline{\underline{2.35V}}$

$I_{E1} = \frac{V_{E1}}{R_E} = \frac{2.35}{1200} = \underline{\underline{1.96mA}}$

$r_{e1} = \frac{25mV}{I_{E1}} = \frac{25mV}{1.96mA} = \underline{\underline{12.8\Omega}}$

$Z_{in2} = R_5 // R_6 // \beta hFE r_{e2}$

$Z_{in2} = \underline{\underline{871\Omega}}$

$r_{e2} = \frac{25mV}{I_{E2}} = \frac{25mV}{2.94mA} = 8.5\Omega$

$V_{B2} = V_{TH} = \frac{V_{CC} R_6}{R_5 + R_6} = \frac{15 \times 11000}{47000 + 11000} = 2.94V$

$R_{TH} = R_5 // R_6 = 9.91K\Omega$

$I_{CQ1} = \frac{V_{E1}}{R_E} = \frac{2.35}{1200} = 1.96mA$

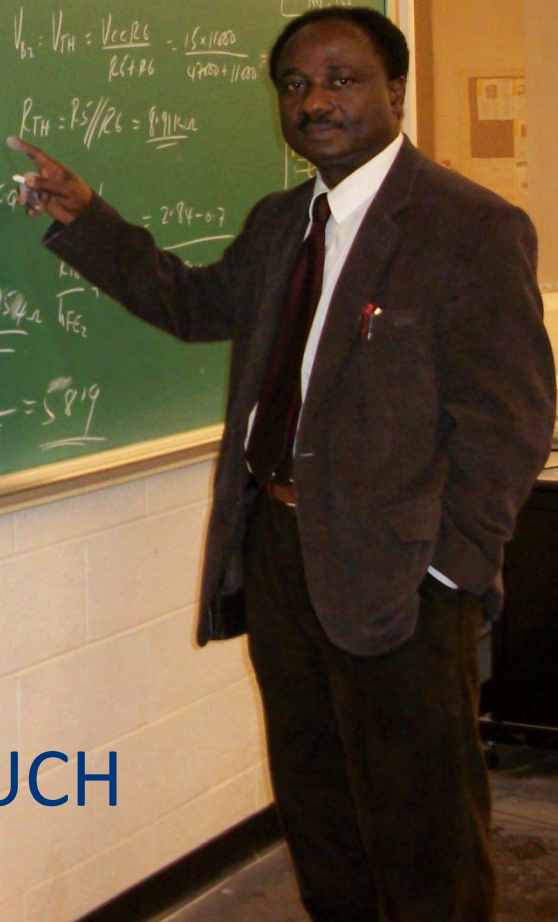
$r_{c1} = R_3 // Z_{in2}$

$r_{c1} = \frac{5600 \times 871}{5600 + 871} = 754\Omega$

$A_{V1} = \frac{r_{c1}}{r_{e1}} = \frac{754}{12.8} = \underline{\underline{58.9}}$

$A_{Vtotal(dB)} = 20 \log_{10} 58.9 + 20 \log_{10} 158 = 33.4 + 42.0 = 75.4dB$

$hFE = 100$



THANK YOU VERY MUCH