Surigao City Campus

Bachelor of Science in Electrical Engineering

SURIGAO STATE COLLEGE OF TECHNOLOGY

SSCT

"For Nation's Greater Heights"

PARAMETER B

INSTRUCTIONAL PROCESS, METHODOLOGIES AND LEARNING OPPORTUNITIES

Surigao City Campus

Bachelor of Science in Electrical Engineering

SURIGAO STATE COLLEGE OF TECHNOLOGY

SSCT

"For Nation's Greater Heights"

SYSTEM – INPUTS AND PROCESSES

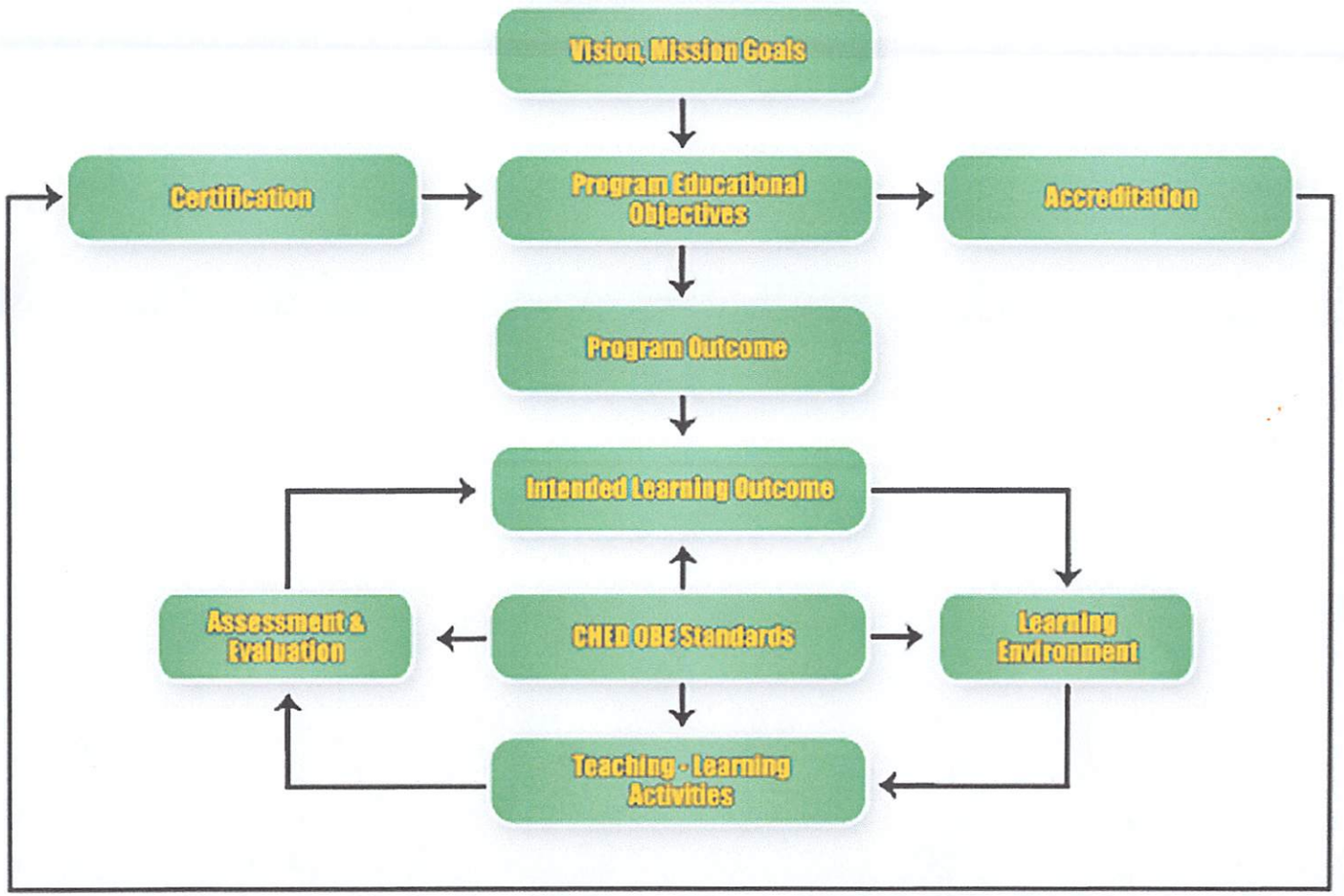
Syllabus and Instructional Materials

S.1. There is an institutional outcomes- based standard format in the preparation of course syllabi.

COLLEGE OF ENGINEERING & INFORMATION TECHNOLOGY

OUTCOMES BASED EDUCATION IN CEIT

OBE FRAMEWORK



VISION	An innovative and technologically-advance State College in Caraga
MISSION	To provide relevant, (a) high quality and sustainable instruction, (b) research, production and extension programs and (c) services within a culture of credible and responsive institutional governance.
GOALS	1. Foster application of the discipline and provide its learner with industry-based training and education particularly in engineering, technology and fisheries. 2. Conduct and utilize studies for the development of new products, systems and services relevant to Philippine life and of the global village. 3. Promote transfer of technology and spread useful technical skills, thus empowering its learners and their activities.
INSTITUTIONAL LEARNING OUTCOME	SSCT graduates are expected to: 1. Demonstrate innovation and technological skills; 2. Exhibit critical thinking, collaboration, and communication; 3. Manifest leadership, adaptability, and responsibility

BS IN ELECTRICAL ENGINEERING	
PROGRAM GOAL	The Electrical Engineering program aims to design and apply the generation, transmission, and distribution of electrical energy to produce competent engineers that exhibit positive work ethics and flexibility in work conditions for the development of Caraga.
PROGRAM EDUCATIONAL OBJECTIVES	*PEO 1.* Innovative and knowledgeable in the latest trends in electrical engineering and demonstrate in their jobs as professional the technical expertise and practical skills. *PEO 2.* Flexible in working with multidisciplinary teams, responsible for providing solutions in electrical engineering showing attributes of professionalism and critical thinking. *PEO 3.* Engage in lifelong learning and are taking leadership roles in electrical engineering organization that are valuable to the advancement of the society.
PROGRAM OUTCOMES	By the time of graduation, the students of the program shall be able to: a) apply knowledge of mathematics and sciences to solve complex engineering problems; b) develop and conduct appropriate experimentation, analyse and interpret data; c) design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards; d) function effectively on multidisciplinary and multi-cultural teams that establish goals, plan tasks, and meet deadlines;; e) identify, formulate, and solve complex problems in electrical engineering; f) recognize ethical and professional responsibilities in engineering practice; g) communicate effectively with a range of audiences; h) understand the impact of engineering solutions in a global, economic, environmental, and societal context; i) recognize the need for additional knowledge and engage in life-long learning; j) articulate and discuss the latest developments in the field of electrical engineering; k) apply techniques, skills, and modern engineering tools necessary for electrical engineering practice; and l) demonstrate knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments.

CURRICULUM MAP

LEGEND:

CODE	DESCRIPTOR	DEFINITION
I	Introductory Course	An introductory course to an outcome
E	Enabling Course	A course that strengthens the outcome
D	Demonstrating Course	A course demonstrating an outcome

BS in Electrical Engineering (BSEE)

COURSES	Relationship to Program Outcomes												
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*
Mathematics													
Calculus 1	I												
Calculus 2	I												
Engineering Data Analysis			I		I						I		
Differential Equations	I				I								
Physical Sciences													
Chemistry for Engineers	I	I											
Physics for Engineers	I	I											
Engineering Sciences													
Computer-Aided Drafting			I				I				I		
Engineering Mechanics	I												
Engineering Economics					I						I		
Allied Courses													
Fundamentals of Deformable Bodies	I												
Electronic Circuits: Devices and Analysis		E			E		I						
Basic Thermodynamics	I												
Industrial Electronics		E			E		I						
Electromagnetics	I				I		I						
Fluid Mechanics	I												
Fundamentals of Electronic Communications							E						
Logic Circuits and Switching Theory			I		I		I						
Microprocessor Systems			I		I		I				I		
Computer Programming											E		
Basic Occupational Safety and Health			I			E		E					
Environmental Science and Engineering						E	I	E					
Materials Science and Engineering						E	I	E		I			
Technopreneurship			I	I		I	E	I	I			I	
Professional Courses													

Engineering Mathematics for EE	D				E						I		
Numerical Methods and Analysis	D				E						E		
Fundamentals of Power Plant Engineering Design			E			E	E						
Management of Engineering Projects				I		E	E			I		E	
Distribution Systems and Substation Design			D		E	I	E	E					
Feedback Control Systems	D				I		E				I		
EE Law, Codes, and Professional Ethics						D	E	E				I	
Electrical Standards and Practices			E			D	E		E				
Electrical Circuits 1		E			E		E						
Electrical Circuits 2		E			E		E						
Electrical Apparatus and Devices		E			E		E						
Electrical Machines 1					E		E						
Electrical Machines 2		E			E		E						
Electrical Systems and Illumination Engineering Design			D	I	D	E	D			E			
Power Systems Analysis			E		D		D			E	D		
Research Methods							D	E	E	E			
Research Project or Capstone Design Project			D	E		D	D	D		E	E		
Instrumentation and Control		D					E						
Seminars/Colloquia							D	D	D	E			
On-the-Job Training				D		D	D	D		E		E	
ELECTIVES 1,2					E	E	D	D	D	E	E		

Source: *CHED Memo No. 87 Series 2017*

Prepared by:

ENGR ROBERT R. BACARRO, MECE, MBA
Dean, CEIT

SURIGAO STATE COLLEGE
OF TECHNOLOGY

"For Nation's Greater Heights"

CERTIFICATE NUMBER: AJA19-0225

COLLEGE OF ENGINEERING & INFORMATION TECHNOLOGY

OFFICE MEMO

REFERENCE NO. : SSCT – CEIT – 08 – 003, S. 19

DATE : AUGUST 19, 2019

TO :

Engr Josephine V. Acido
Dr Rosanne E. Andaluz
Engr Richard A. Badiola
Engr Joselito S. Baldapan (*PC*)
Renz M. Buctuan
Dr Unife O. Cagas
Engr Aldrich B Calinawan
Engr Levi A. Corvera
Dr Monalee A. Dela Cerna (*PC*)
Engr Conrado Jr. B. Delosa
Trashy P. Dumaicos
Dr Jessica Rose E. Fernandez (*PC*)
Dr Vimille C. Francisco
Jovie M. Gallera
Dr Aurea M. Madelo
Arvin E. Mag-Usara
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Dr Analyn S. Morite (*PC*)
Engr Crispin P. Noguerra
Engr Gracechell M. Pascua
Arch Lufre Potente
Engr Virne P. Portugues
Alma Christie C. Reyna (*PC*)
Engr Ritchie A. Reyna
Engr Perfecto Jr. R. Ruaya
Arch Marlon C. Solloso
Teresita L. Toledo
Dr Vrian Jay V. Ylaya

Ralph Aran C. Cabañero
Engr Ingrid Escabal
Engr Jemielou M. Fideles
Engr Galgen B. Galila
Engr Ghandi B. Galila
Engr Archie C. Gegona
Jessa G. Hambre
Engr Vernon V. Liza
Engr Andy Bong F. Navarro
Engr Erlito M. Orit
Engr Elmario Pejan
Hasmer Salubre

FROM : ENGR ROBERT R. BACARRO, MECE, MBA
Dean, CEIT

SUBJECT : **SUBMISSION OF COURSE SYLLABUS AS OF 1ST SEMESTER, A.Y. 2019 – 2020 ON OR BEFORE AUGUST 27, 2019**

Greetings!

In line with our ISO process, you are hereby directed to submit your Course Syllabi to your respective Program Chairs on or before August 27, 2019 following the correct and approved ISO format. These course syllabi are signed already by all the signatories from the instructor up to the VP for Academic Affairs.

ENGR ROBERT R. BACARRO, MECE, MBA
Dean, CEIT

Tel. Nos.: (086) 826-0135;
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Email: surigaostatecollege@yahoo.com
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SURIGAO STATE COLLEGE OF TECHNOLOGY
Narciso St., Surigao City
"To Make A Quality Life" COLLEGE OF ENGINEERING & INFORMATION TECHNOLOGY

SSCT SURIGAO CITY
OFFICE OF VP ACADEMIC AFFAIRS
RECEIVED
DATE Feb 19, 2019
NAME

OFFICE MEMO

REF. NO. : CEIT-016-2019

DATE : FEBRUARY 19, 2019

TO :

ENGR VIRNE P. PORTUGUES
ENGR ROSANNE E. ANDALUZ
ENGR RICHARD A. BADIOLA
ARCH MARLON C. SOLLOSO
ENGR JOHN RODERICK R. BUICO
ENGR ERLITO M. ORIT
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ENGR ALDRICH B. CALINAWAN
ENGR DARWIN C. MANGCA,
ENGR CONRADO B. DELOSA JR.
ENGR JOSELITO S. BALDAPAN
ENGR JOSEPHINE V. ACIDO
ENGR JEMELOU M. FIDELES,
ENGR GALGEN B. GALILA
ENGR ANDY BONG F. NAVARRO
ENGR VERNON V. LIZA
DR ANALYN S. MORITE
ENGR LUCILYN C. BORJA
ENGR LEVI A. CORVERA
ENGR GRACECHELL M. PASCUA
ENGR GHANDI B. GALILA
MARQUEZO, VANESSA A.
OGAOB, DEAN MARK A.
DR MONALEE A. DELA CERNA
DR UNIFE O. CAGAS
DR VIRNILLE C. FRANCISCO
DR JESSICA ROSE E. FERNANDEZ
DR FROILAN JAY E. GUIRAL
TERESITA L. TOLEDO
ALMA CHRISTIE C. REYNA
RENZ M. BUCTUAN
TRASHY P. DUMAICOS
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RALPH ARAN C. CABAÑERO
ENGR RITCHIE A. REYNA
ARVIN E. MAG-USARA
AMOR C. MONTEJO
ENGR CRISPIN P. NOGUERRA
JESSA G. HAMBRE
HASMER SALUBRE
CARLOS H. DONOSO
ELMA C. ECHIN
JUDEL D. PAREDES
JEAN DARYL P. AMPONG
EVA MARY A. BIRAO
RENALDO R. CERVANTES JR.
LIEZL C. GALGO
KEVIN M. PAYNANDOS

FROM : ENGR ROBERT R. BACARRO, MECE, MBA
Dean, CEIT

SUBJECT : **SUBMISSION OF COURSE SYLLABUS**

CC : DR RONITA E. TALINGTING
VP for Academic Affairs

Greetings!

In lieu of our job as teachers, you are hereby required to submit all the **COURSE SYLLLABI** of all the courses assign in your Teachers Program on or before March 1, 2019. This document is required when the Program Chair will observe your class next month.

Thank you for your support.

ENGR ROBERT R. BACARRO, MECE, MBA
Dean, CEIT

Republic of the Philippines
OFFICE OF THE PRESIDENT
COMMISSION ON HIGHER EDUCATION

CHED MEMORANDUM ORDER
No. 88
Series of 2017

SUBJECT: POLICIES, STANDARDS AND GUIDELINES FOR THE BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING (BSEE) PROGRAM EFFECTIVE ACADEMIC YEAR (AY) 2018-2019

In accordance with the pertinent provisions of Republic Act (RA) No. 7722, otherwise known as the "*Higher Education Act of 1994*," in pursuance of an outcomes-based quality assurance system as advocated under CMO 46 s. 2012 (Policy-Standard to Enhance Quality Assurance (QA) in Philippine Higher Education through an Outcomes-Based and Typology-Based Quality Assurance) and as addendum to CMO 37, s. 2012 (Establishment of an Outcomes-Based Educational System in Higher Education Institutions offering Engineering Programs), and by virtue of Commission en banc Resolution No. 788-2017 dated October 24, 2017 the following Policies, Standards and Guidelines (PSG) are hereby adopted and promulgated by the Commission.

ARTICLE I
INTRODUCTION

Section 1. Rationale

Based on the Guidelines for the Implementation of CMO No. 46 series of 2012 and CMO 37 s. 2012, this PSG implements the shift to outcomes-based education leading to competency-based standards. It specifies the core competencies expected of BS Electrical Engineering graduates regardless of the type of Higher Education Institutions (HEI) they graduate from. However, in recognition of outcomes-based education (OBE) and the typology of HEIs, this PSG also provides ample space for HEIs to innovate in the curriculum in line with the assessment of how best to achieve learning outcomes in their particular contexts and their respective missions.

ARTICLE II
AUTHORITY TO OPERATE

Section 2. Government Recognition

All private higher education institutions (PHEIs) intending to offer BS Electrical Engineering shall first secure proper authority from the Commission in accordance with this PSG. All PHEIs with an existing BSEE program are required to shift to an outcomes-based approach based on CMO 37 s. 2012 and guided by this PSG. State universities and colleges (SUCs), and local universities and colleges (LUCs) shall likewise strictly adhere to the provisions in these policies and standards.

ARTICLE III
GENERAL PROVISIONS

Per Section 13 of RA 7722, the higher education institution shall exercise academic freedom in its curricular offerings but must comply with the minimum requirements for specific academic programs, the general education distribution requirements and the specific professional courses.

Section 3. Minimum Standards

The Articles that follow give minimum standards and other requirements and guidelines. The minimum standards are expressed as a minimum set of desired program outcomes which are given in Article IV Section 6. CHED designed a curriculum to attain such outcomes. This curriculum is shown in Article V Section 10 and Section 11 as **sample curriculum**. The number of units of this curriculum is here prescribed as the "minimum unit requirement" under Section 13 of RA 7722. To assure alignment of the curriculum with the program outcomes, this PSG provides a sample curriculum map for the HEI to refer to in compliance with the implementing guidelines of CMO 37 s. 2012.

Using a learner-centered/outcomes-based approach, CHED provided a description of Outcomes-Based Teaching and Learning delivery method in Article V Section 13. A sample course syllabus is also given in Article V Section 14 as support to the outcomes-based delivery method. Based on the curriculum and the means of its delivery, CHED determined the physical resource requirements for the library, laboratories and other facilities and the human resource requirements in terms of administration and faculty. These are provided for in Article VI.

Section 4. Curriculum Design

HEIs are allowed to design curricula suited to their own contexts and missions provided that they can demonstrate that the same leads to the attainment of the required minimum set of outcomes, albeit by a different route. In the same vein, they have latitude in terms of curriculum delivery and in terms of specification and deployment of human and physical resources as long as they can show that the attainment of the program outcomes and satisfaction of program educational objectives can be assured by the alternative means they propose.

The HEIs may use the **CHED Implementation Handbook for Outcomes-Based Education (OBE) and the Institutional Sustainability Assessment (ISA)** as a guide in making their submissions for Sections 19 to 21 of Article VII.

ARTICLE IV
PROGRAM SPECIFICATIONS

Section 5. Program Description

5.1 Degree Name

The degree program described herein shall be called Bachelor of Science in Electrical Engineering (BSEE).

5.2 Nature of the Field of Study

Electrical Engineering is a profession that involves the conceptualization, development, design and application of safe, healthy, ethical, economical and sustainable generation, transmission, distribution and utilization of electrical energy for the benefit of society and the environment through the knowledge of mathematics, physical sciences, information technology and other allied sciences, gained by study, research and practice.

Electrical Engineering is one of the broader fields of the engineering disciplines both in terms of the range of problems that fall within its purview and in the range of knowledge required to solve these problems.

5.3 Program Educational Objectives (PEOs)

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing

graduates to achieve within three to five years from graduation. PEOs are based on the needs of the program's constituencies and these shall be determined, articulated, and disseminated to the general public by the unit or department of the HEI offering the program. The PEOs shall also be assessed and evaluated periodically for continuing quality improvement.

5.4 Specific Professions/Careers/Occupations for Graduates

The scope of practice of Electrical Engineering is defined in Section 2a of the prevailing Electrical Engineering Law or RA 7920 and pertains to professional services and expertise including, but not limited to:

a. Consultation, investigation, valuation and management of services requiring electrical engineering knowledge;
b. Design and preparation of plans, specifications and estimates for electric power systems, power plants, power distribution systems including power transformers, transmission lines and network protection, switchgear, building wiring, electrical machines, equipment and others;
c. Supervision of erection, installation, testing and commissioning of power plants, substations, transmission lines, industrial plants and others;
d. Supervision of operation and maintenance of electrical equipment in power plants, industrial plants, watercrafts, electric locomotives and others;
e. Supervision in the manufacture and repair of electrical equipment including switchboards, transformers, generators, motors, apparatus and others;
f. Teaching of electrical engineering professional courses; and
g. Taking charge of the sale and distribution of electrical equipment and systems requiring engineering calculations or applications of engineering data.

The fields of specialization may include, but not limited to, the following: power system operation and protection, power plant operation and maintenance, advanced electrical systems design and inspection, sales and entrepreneurship, engineering education and research, instrumentation and control systems, construction and project management, software development, electricity market, and safety engineering.

5.5 Allied Programs

The following programs, among others, may be considered as allied to Electrical Engineering:

1. Computer Engineering
2. Electronics Engineering
3. Mechanical Engineering
4. Civil Engineering
5. Chemical Engineering
6. Industrial Engineering
7. Computer Science
8. Information Technology

Section 6. Institutional and Program Outcomes

The minimum standards for the **BSEE** program are expressed in the following minimum set of institutional and program outcomes.

6.1 Institutional Outcomes

a) Graduates of professional institutions shall be able to demonstrate a service orientation in one's profession.
b) Graduates of colleges shall be able to participate in various types of employment, development activities, and public discourses, particularly in response to the needs of the communities one serves.
c) Graduates of universities shall be able to participate in the generation of new knowledge or in research and development projects.
d) Graduates of state universities and colleges shall, in addition, have the competencies to support "national, regional and local development plans." (RA 7722).
e) Graduates of higher educational institutions shall preserve and promote the Filipino historical and cultural heritage. (based on RA 7722)

6.2 BSEE Program Outcomes

By the time of graduation, students of the program shall have developed the ability to:

a) Apply knowledge of mathematics and sciences to solve complex engineering problems;
b) Develop and conduct appropriate experimentation, analyze and interpret data;

c) Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards;
d) Function effectively on multi-disciplinary and multi-cultural teams that establish goals, plan tasks, and meet deadlines; *(based on **PQF Level 6 descriptor**)*
e) Identify, formulate and solve complex problems in electrical engineering;
f) Recognize ethical and professional responsibilities in engineering practice;
g) Communicate effectively with a range of audiences;
h) Understand the impact of engineering solutions in a global, economic, environmental, and societal context;
i) Recognize the need for additional knowledge and engage in lifelong learning;
j) Articulate and discuss the latest developments in the field of electrical engineering; ***(PQF Level 6 descriptor)***
k) Apply techniques, skills, and modern engineering tools necessary for electrical engineering practice; and
l) Demonstrate knowledge and understanding of engineering and management principles as a member and/or leader in a team to manage projects in multidisciplinary environments.

A PHEI, SUC or LUC, at its option, may adopt mission-related program outcomes that are not included in the minimum set as specified above. Accordingly, PHEIs, SUCs, and LUCs may rewrite the program outcomes as stated above, provided that the meaning and essentials of the (a) to (l) program outcomes are substantially covered.

Annex I presents the Competency Standards, Attributes and Competencies of an Electrical Engineer which should result from the program outcomes stated above.

HEIs may also consider the International Engineering Alliance (IEA) graduate attributes and professional competency profiles for three professional tracks: engineer, engineering technologist and engineering technician. Refer to Annex IA or to the IEA website: http://www.ieagreements.org.

Section 7. Sample Performance Indicators/Criteria

Performance Indicators are specific, measurable statements identifying the performance(s) required to meet the outcome; confirmable through evidence(s).

Table 1. Sample Performance Indicators of a Program Outcome

Program Outcome		Sample Performance Indicators	
g	Communicate effectively with a range of audiences.	g.1	Discuss the analysis of an electrical circuit problem with his/her fellow students.
		g.2	Write a comprehensive laboratory report.
		g.3	Defend satisfactorily his/her thesis or design project from a panel of experts.

Section 8. Program Assessment and Evaluation

8.1 Program Assessment refers to one or more processes that identify, collect, and prepare data to evaluate the attainment of Program Outcomes and Program Educational Objectives.

8.2 Program Evaluation pertains to one or more processes for interpreting the data and evidence(s) accumulated from the assessment. Evaluation determines the extent at which the Program Outcomes and the Program Educational Objectives are achieved by comparing actual achievements versus set targets and standards. Evaluation results in decisions and actions to be implemented for the continuous improvement of the program.

All HEIs are encouraged to form a Consultative Body, represented by the stakeholders, to be part of the assessment and evaluation processes.

8.3 Assessment and Evaluation of PEOs

The assessment and evaluation of Program Educational Objectives may include feedback from the stakeholders of the program through surveys or focus group discussions to obtain data on the extent of achievement of the PEOs.

8.4 Assessment and Evaluation of POs

In the case of program outcomes assessment, the defined performance indicators shall be connected to key courses (usually the Demonstrating or "D" courses in the curriculum map), and appropriate assessment methods may be applied. These methods may be direct or indirect depending on whether the demonstration of learning was measured by

actual observation and authentic work of the student or through gathered opinions from the student or his/her peers. Refer to Table 2.

Table 2. Sample Matrix Linking Performance Indicators with Key Courses and Assessment Methods

Performance Indicators		Key Course(s)	Assessment Methods
g.1	Discuss the analysis of an electrical circuit problem with his/her fellow students.	Electrical Circuits 2	Recitation; oral exam
g.2	Write a comprehensive laboratory report.	Electric Machinery 2	Laboratory report
g.3	Defend satisfactorily his/her thesis or design project from a panel of experts.	Thesis/Design Project	Thesis/design project presentation

Table 3. Sample Matrix Linking Assessment Methods with Set Targets and Standards

Key Course(s)	Assessment Methods	Targets and Standards
Electrical Circuits 2	Recitation; oral exam	90% of the class gets a rating of at least 70%
Electric Machinery 2	Laboratory report	90% of the class gets a rating of at least 70%
Thesis/Design Project	Thesis/design project presentation	75% of the class gets a rating of at least 70%

Other methods of Program Assessment and Evaluation may be found in the **CHED Implementation Handbook for Outcomes-Based Education (OBE)** and **Institutional Sustainability Assessment (ISA)**.

Section 9. Continuous Quality Improvement

There shall be a documented process for the assessment and evaluation of program educational objectives and program outcomes.

The comparison of achieved performance indicators with declared targets or standards of performance shall serve as basis for the priority projects or programs for improving the weak performance indicators. Such projects and programs shall be documented as well as the results of their implementation. This regular cycle of documentation of projects, programs for remediation and their successful implementation shall serve as the evidence for Continuous Quality Improvement.

ARTICLE V
CURRICULUM

Section 10. Curriculum Description

The Electrical Engineering curriculum is designed to meet the BSEE program outcomes stated in Article IV Section 6.2. The curriculum shall develop electrical engineers who have a background in mathematics, natural, physical and allied sciences. As such the curriculum contains courses in college-level mathematics, calculus-based physics, chemistry, materials and environmental sciences with emphasis on the development of analytical and creative abilities. The curriculum also contains mandated general education and elective courses as connected to the desired program outcomes. This is to ensure that the electrical engineering graduates can understand and articulate the nature of their special role in society and the impact of their work on the environment. The curriculum is designed to guarantee a certain breadth of knowledge of the Electrical Engineering discipline through a set of core courses and to ensure depth and focus in certain specializations through track elective courses. A minimum of 240 hours of immersion in electrical engineering activities outside the institution and a capstone design project or a research project in electrical engineering are the final requirements of the curriculum.

The curriculum has a minimum total of 168 credit units, comprising of 118 units of technical courses. These technical courses include 12 units of mathematics, 8 units of natural/physical sciences, 7 units of basic engineering sciences, 34 units of allied courses, 51 units of professional courses (common), and 6 units of professional courses (specialized) or electives.

The non-technical courses in accordance with CMO 20 s. 2013 - the new General Education Curriculum (GEC) - consists of 36 units of general education courses distributed as follows: 24 units of core courses, 9 units of GEC electives, and 3 units of Life and Works of Rizal.

The new GEC also includes 8 units of Physical Education (PE), and 6 units of National Service Training Program (NSTP).

Section 11. Minimum Curriculum

11.1 Components

Below is the minimum curriculum of the BSEE program. The institution may enrich the minimum curriculum depending on the needs of the industry and community, provided that all prescribed courses are offered and pre-requisites and co-requisites are observed.

Classification/ Field / Course	Minimum No. of Hours/week		Credit Units
	Lecture	Lab/Field/ Design/Drafting	
I. TECHNICAL COURSES			
A. Mathematics			
Calculus 1	3	0	3
Calculus 2	3	0	3
Engineering Data Analysis	3	0	3
Differential Equations	3	0	3
Sub – total	**12**	**0**	**12**
B. Natural/Physical Sciences			
Chemistry for Engineers	3	3	4
Physics for Engineers	3	3	4
Sub – total	**6**	**6**	**8**
C. Basic Engineering Sciences			
Computer-aided Drafting	0	3	1
Engineering Mechanics	3	0	3
Engineering Economics	3	0	3
Technopreneurship 101	3	0	3
Sub – total	**9**	**3**	**10**
D. **Allied Courses**			
Fundamentals of Deformable Bodies	2	0	2
Materials Science and Engineering	2	0	2
Electronic Circuits: Devices and Analysis	3	3	4
Basic Thermodynamics	2	0	2
Industrial Electronics	3	3	4
Electromagnetics	2	0	2
Fluid Mechanics	2	0	2
Fundamentals of Electronic Communications	3	0	3
Logic Circuits and Switching Theory	2	0	2
Microprocessor Systems	2	0	2
Computer Programming	0	3	1

Classification/ Field / Course	Minimum No. of Hours per week		Credit Units
	Lecture	Lab/Field/ Design/Drafting	
Basic Occupational Safety and Health	3	0	3
Environmental Science and Engineering	2	0	2
Sub - total	**28**	**9**	**31**
E. Professional Courses			
Numerical Methods and Analysis	2	3	3
EE Law, Codes, and Professional Ethics	2	0	2
Electrical Standards and Practices	0	3	1
Electrical Circuits 1	3	3	4
Electrical Circuits 2	3	3	4
Electrical Apparatus and Devices	2	3	3
Electrical Machines 1	2	0	2
Electrical Machines 2	3	3	4
Engineering Mathematics for EE	3	0	3
Electrical Systems and Illumination Engineering Design	3	6	5
Power System Analysis	3	3	4
Fundamentals of Power Plant Engineering Design	0	3	1
Distribution Systems and Substation Design	2	3	3
Management of Engineering Projects	2	0	2
Research Methods	0	3	1
Research Project or Capstone Design Project	0	3	1
Instrumentation and Control	2	3	3
Feedback Control Systems	2	0	2
Seminars/Colloquia	0	3	1
On-the-job Training	2	(240 hours)	2
ELECTIVES 1, 2	6	0	6
Sub – total	42	45	57

Classification/ Field / Course	Minimum No. of Hours per week		Credit Units
	Lecture	Lab/Field/ Design/Drafting	
II. NON-TECHNICAL COURSES - New General Education Curriculum (GEC)			
A. GE Core Courses			
Science, Technology and Society	3	0	3
Contemporary World	3	0	3
Readings in Philippine History	3	0	3
Understanding the Self	3	0	3
Art Appreciation	3	0	3
Purposive Communication	3	0	3
Mathematics in the Modern World	3	0	3
Ethics	3	0	3
B. Electives / Mandated Course			
GEC Elective 1	3	0	3
GEC Elective 2	3	0	3
GEC Elective 3	3	0	3
Life and Works of Rizal	3	0	3
Physical Education 1, 2, 3, 4 (2 units each)			8
National Service Training Program 1 & 2 (3 units each)			6
Total (Non-technical Courses)	**50**		**50**
GRAND TOTAL	**147**	**63**	**168**

Suggested Track Elective Courses

Other specialized courses may be offered, developed and described by the HEIs in accordance with their needs.

As much as possible, the track elective courses shall be designed and developed by HEIs to be about 70% hands-on and 30% theoretical as almost all industries require graduates ready to start working with very short training about company processes.

1. Power System Protection – protection of generators, transformers, bus-bars and lines; protective relaying; surge protection in power systems
2. Advanced Power System Analysis and Design - transmission and distribution; power substation; industrial and commercial power systems

3. Advanced Electrical Systems Design – high rise building design; substation design; high-voltage underground cable design (AC/DC systems)
4. Entrepreneurship – project management; project acceptance, testing and documentation; sales and marketing management
5. Machine Automation and Process Control – pneumatics and process control; electro pneumatics; PLC in manufacturing
6. Special Studies in Renewable Energy Resources – solar and wind energy; waves/ocean energy; biomass energy
7. Substation maintenance – testing of power transformers, power circuit breakers, PT and CT, surge arresters, grounding grid, and lightning arresters; shall cover specific IEEE methodologies such as insulation power factor, over-all winding resistance, and leakage reactance, among others
8. Maintenance of power generators, using latest technologies to determine stator breakdowns, partial discharge for isolated phase bus, etc.
9. Testing and commissioning for electrical systems, compliant to NETA (National Electrical Testing Association) Standards, IEC Standards, and other standards recognized by the industry worldwide
10. Electrical audit evaluation that includes power system simulations to determine the required short circuit analysis, protection coordination, load flow, arc flash, harmonics determination and mitigation including high frequency noise presence in the system in addition to low frequency harmonics
11. Electrical estimating for power system, distribution system, commercial, industrial and high-rise building designs with project components to report

Summary of the BSEE Curriculum

Classification/ Field / Course	Minimum No. of Hours/Week		Minimum Credit Units
	Lecture	Lab/Field/ Design/Drafting	
I. Technical Courses			
A. Mathematics	12	0	12
B. Natural Sciences	6	6	8
C. Engineering Sciences	6	3	7
D. Allied Courses	31	9	34
E. Professional Courses	36	45	51
F. Electives	6	0	6
TOTAL (TECHNICAL)	**97**	**63**	**118**
II. Non-Technical Courses			
A. Core Courses	24	0	24
B. Electives	9	0	9
C. Mandated Course	3	0	3
D.Physical Education			8
E.NSTP			6
TOTAL (NON-TECHNICAL)	**50**		**50**
GRAND TOTAL	**147**	**63**	**168**

11.2 Program of Study

The institution may enrich the **sample** model of program of study depending on the needs of the industry, provided that all prescribed courses required in the curriculum outline are offered and pre-requisites and co-requisites are complied with.

The sample Program of Study listed below is meant for HEIs operating on a semestral system. HEIs with CHED - approved trimestral or quarter systems may adjust their courses and course specifications accordingly to fit their delivery system, as long as the minimum requirements are still satisfied.

The HEIs are also encouraged to include other courses to fulfill their institutional outcomes, as long as the total units for the whole program shall not be less than **168 units**, including PE and NSTP.

Sample Program of Study

FIRST YEAR

First Year - First Semester

Courses/Subjects	Minimum No. of Hours		Total units	Pre-Requisite
	Lec	L/F/D		
Calculus 1	3	0	3	
Chemistry for Engineers	3	3	4	
Computer-aided Drafting	0	3	1	
Mathematics in the Modern World	3	0	3	
Understanding the Self	3	0	3	
Science, Technology and Society	3	0	3	
NSTP 1	3	0	3	
PE 1	2	0	2	
SUB-TOTAL	20	6	22	

Note: L/F/D stands for Laboratory, Field Work, Design or Drafting

First Year - Second Semester

Courses/Subjects	Minimum No. of Hours		Total Units	Pre-Requisite
	Lec	L/F/D		
Calculus 2	3	0	3	Calculus 1
GEC Elective 1	3	0	3	
Computer Programming	0	3	1	
Physics for Engineers	3	3	4	Co-requisite: Calculus 2
Purposive Communication	3	0	3	
Contemporary World	3	0	3	
NSTP 2	3	0	3	
PE 2	2	0	2	
SUB-TOTAL	20	6	22	

SECOND YEAR

Second Year - First Semester

Courses/Subjects	Minimum No. of Hours		Total Units	Prerequisite
	Lec	L/F/D		
Differential Equations	3	0	3	Calculus 2
Electrical Circuits 1	3	3	4	Physics for Engineers; Calculus 2
Engineering Mechanics	3	0	3	Physics for Engineers
GEC Elective 2	3	0	3	
Art Appreciation	3	0	3	
Engineering Data Analysis	3	0	3	Calculus 1
PE 3	2	0	2	
SUB-TOTAL	20	3	21	

Second Year - Second Semester

Courses/Subjects	Minimum No. of Hours		Total Units	Prerequisite
	Lec	L/F/D		
Engineering Math for EE	3	0	3	Differential Equations
Fundamentals of Deformable Bodies	2	0	2	Engineering Mechanics
Electrical Circuits 2	3	3	4	Electrical Circuits 1
Electronic Circuits: Devices and Analysis	3	3	4	Electrical Circuits 1
Basic Thermodynamics	2	0	2	Physics for Engineers
GEC Elective 3	3	0	3	
Electromagnetics	2	0	2	Physics for Engineers; Differential Equations
PE 4	2	0	2	
SUB-TOTAL	20	6	22	

THIRD YEAR

Third Year - First Semester

Courses/Subjects	Minimum No. of Hours		Total Units	Pre-Requisite
	Lec	L/F/D		
Numerical Methods and Analysis	2	3	3	Engineering Math for EE
Logic Circuits and Switching Theory	2	0	2	Electronic Circuits: Devices and Analysis
Engineering Economics	3	0	3	Engineering Data Analysis
Industrial Electronics	3	3	4	Electronic Circuits: Devices and Analysis
Fundamentals of Electronic Communications	3	0	3	Electronic Circuits: Devices and Analysis
Electrical Machines 1	2	0	2	Electromagnetics; Electrical Circuits 2
Ethics	3	0	3	
SUB-TOTAL	18	6	20	

Third Year - Second Semester

Courses/Subjects	Minimum No. of Hours		Total Units	Pre-Requisite
	Lec	L/F/D		
Microprocessor Systems	2	0	2	Logic Circuits and Switching Theory
Electrical Apparatus and Devices	2	3	3	Electrical Circuits 2
Electrical Machines 2	3	3	4	Electrical Machines 1
Basic Occupational Safety and Health	3	0	3	
Fluid Mechanics	2	0	2	Physics for Engineers
Environmental Science and Engineering	2	0	2	
EE Law, Codes, and Professional Ethics	2	0	2	Ethics
Feedback Control Systems	2	0	2	Engineering Math for EE; Electronic Circuits: Devices and Analysis
SUB-TOTAL	18	6	20	

SUMMER				
On-the-Job Training	2	240 hrs	2	4th year standing
SUB-TOTAL	2		2	

FOURTH YEAR

Fourth Year - First Semester

Courses/Subjects	Minimum No. of Hours		Total Units	Pre-Requisite
	Lec	L/F/D		
Materials Science and Engineering	2	0	2	Chemistry for Engineers; Fundamentals of Deformable Bodies
Electrical Standards and Practices	0	3	1	EE Law, Codes, and Professional Ethics
Electrical Systems and Illumination Engineering Design	3	6	5	Electrical Machines 2
EE Elective 1	3	0	3	4th year standing
Management of Engineering Projects	2	0	2	Engineering Economics
Research Methods	0	3	1	Engineering Data Analysis
Instrumentation and Control	2	3	3	Feedback Control Systems
Technopreneurship	3	0	3	4th year standing
SUB-TOTAL	**15**	**15**	**20**	

* The nth Year Standing means that the student shall have completed at least 75% of the load requirements of the previous year level.

Fourth Year - Second Semester

Courses/Subjects	Minimum No. of Hours		Total Units	Pre-Requisite
	Lec	L/F/D		
Power Systems Analysis	3	3	4	Electrical Standards and Practices
Fundamentals of Power Plant Engineering Design	0	3	1	Co-requisite: Power Systems Analysis
Distribution Systems and Substation Design	2	3	3	Co-requisite: Power Systems Analysis
EE Elective 2	3	0	3	EE Elective 1
Research Project or Capstone Design Project	0	3	1	Research Methods
Seminars/Colloquia	0	3	1	4th year standing
Life and Works of Rizal	3	0	3	
Readings in Philippine History	3	0	3	
SUB-TOTAL	**14**	**15**	**19**	

Research Project or Capstone Design Project – shall focus on the established program research agenda of the HEI and may involve, among others, any of the following areas:

1. Alternative Energy Resources
2. Innovative Electrical Equipment Design
3. Development of software for Electrical Circuit Analysis and Design, Electrical Systems Analysis and Design, and Power System Analysis and Design
4. Design of means of transportation using electricity
5. Development of low-cost sustainable eco-materials for electrical installations
6. Other projects related to the practice of the Electrical Engineering profession

On-the-job-training / practicum – shall require a minimum of 240 hours. At the discretion of the HEIs, industry immersion may be substituted with student projects that will enhance, modernize, and elevate the level of effectiveness and relevance of electrical engineering education.

NOTE: PHEIs, SUCs, LUCs shall see to it that the institution has very strong linkage programs with industry and the government to ensure that all qualified EE students can be accommodated when they take their on-the-job training (OJT) program.

Seminars/Colloquia – seminars shall involve relevant topics and latest developments in the electrical engineering field. This course also includes attendance/participation of the students and/or presentation of student research project or capstone design project in a research colloquium or forum.

Section 12. Curriculum Map

As per CMO 37 s. 2012, a curriculum map is a matrix relating all the courses listed in the program curriculum with one or more of the declared program outcomes.

HEIs/LUCs/SUCs shall develop a complete curriculum map for their current or existing BSEE curriculum. Refer to Annex II for a **sample** curriculum map that demonstrates the extent of relationships between the courses and the program outcomes.

Section 13. Description of Outcomes-Based Teaching and Learning (OBTL) System

Outcomes-based teaching and learning (OBTL) is an approach where teaching and learning activities are developed to support the learning outcomes (University of Hong Kong, 2007). OBTL is a student-centered approach where the courses contained in the program curriculum are designed to achieve intended student outcomes. It is

an approach in which teachers facilitate and students find themselves actively engaged in their learning.

Its primary focus is on the clear statements of what students should be able to do with what they know after completing a course (intended learning outcomes). These are statements, written from the students' perspective, indicating the level of understanding and performance they are expected to achieve as a result of engaging in teaching and learning experience (Biggs and Tang, 2007). Once these intended learning outcomes or course outcomes (ILOs or COs) have been established, appropriate teaching/learning activities (TLAs) are developed. A TLA is any activity which stimulates, encourages or facilitates learning of one or more ILOs. The final OBTL component involves the Assessment Tasks (ATs), which measure how well students can use their new abilities to solve real-world problems, design, demonstrate creativity and logical thinking, and communicate effectively, among others. An AT can be any method of assessing how well a set of ILOs has been achieved.

A key component of a course design using OBTL is the constructive alignment of ILOs, TLAs, and ATs. This design methodology requires the Intended Learning Outcomes to be developed first. Then the Teaching / Learning Activities and Assessment Tasks are developed based on the ILOs. (Biggs, 1999)

"Constructive" refers to the idea that students construct meaning through relevant learning activities; "alignment" refers to the situation when teaching and learning activities, and assessment tasks, are aligned to the Intended Learning Outcomes by using the verbs stipulated in the ILOs. Constructive alignment provides the "how-to" by stating that the TLAs and the assessment tasks activate the same verbs as in the ILOs. (Biggs and Tang, 1999)

The OBTL approach shall be reflected in all course syllabi to be implemented by the faculty.

Section 14. Course Syllabus and Course Specifications:

The course syllabus shall contain at least the following components:

1. General Course Information (Title, Description, Code, Credit Units, Prerequisites)
2. Links to Program Outcomes
3. Course Outcomes
4. Course Outline (Including Unit Outcomes)
5. Teaching and Learning Activities
6. Assessment Methods
7. Final Grade Evaluation

8. Learning Resources
9. Course Policies and Standards
10. Effectivity and Revision Information

Refer to **Annex III** for sample course specifications and Annex V for a sample course syllabus.

ARTICLE VI
REQUIRED RESOURCES

This article covers the specific required resources for the BS Electrical Engineering program. All other requirements on Administration, Library and Laboratory facilities, and buildings for the BS Engineering Programs are contained in CMO No. 86 s. 2017 - Policies, Standards and Guidelines for Requirements Common to all BS Engineering Programs issued by the Commission.

Section 15. Administration

The administration of the college of engineering must provide academic governance and leadership to engineering programs by exerting efforts to achieve program educational objectives and program outcomes. As such, the college shall have a full-time dean and a full-time department head or program chair/coordinator who are adept in the principles of outcomes-based education and are trained to implement the elements of OBE and OBTL as required in CMO 37 s 2012.

There shall be a full-time Department Head or Program Chair/Coordinator who shall lead in curriculum planning, implementation, monitoring, review, and evaluation of the BSEE program. If the College Dean is a licensed Electrical Engineer, he may serve as concurrent Department Head or Program Chair/Coordinator in extreme cases such as low enrollment.

The Department Head or Program Chair/Coordinator of the BSEE program:

a) shall be a holder of a baccalaureate degree in Electrical Engineering and a master's degree in electrical engineering, engineering education, or allied program;
b) shall be a registered Electrical Engineer with valid PRC license; and
c) shall have a teaching experience of not less than three years and at least three years of experience in industry practice or academic administration

To ensure the effectiveness and efficiency of his/her work, the Department Head or Program Chair/Coordinator may be given a teaching load of not more than 50% of the regular teaching load.

Section 16. Faculty

16.1 Requirements

Faculty members handling the professional courses shall be registered electrical engineers with valid PRC license. In addition, faculty handling professional design courses shall have industry design experience.

To effectively implement the curricular requirements of the program there shall be an adequate number of competent and qualified faculty to handle the professional courses. The program shall not be dependent on one faculty member handling the professional courses.

By AY 2018-2019 all full-time faculty members teaching the professional courses in the BSEE curriculum shall be holders of a master's degree in Electrical Engineering or allied program.

16.2 Duties

The faculty shall sustain active participation and involvement in the following:

a. Curriculum review and revision, decision-making, and implementation of the academic program;
b. Program assessment and evaluation, and implementation of continuous improvement of the program;
c. Development, improvement, and achievement of the course outcomes (COs);
d. Enrichment of teaching and learning activities (TLAs);
e. Development and improvement of assessment tasks, constructively aligned with COs and TLAs;
f. Student advising activities;
g. Linkages, professional/community extension services and community outreach programs;
h. Review and recommendations with regards to the library and other learning resources and the modernization/upgrading of the laboratory equipment and facilities; and
i. Professional development in research, scholarly work, and electrical engineering practice.

Section 17. Library and Other Learning Resources

The library services and other learning resources shall be adequate to support the scholarly and professional activities of the students and faculty. A progressive development plan and implementation report shall be periodically prepared as evidence in this regard.

The library collection and other learning resources shall be adequate and regularly updated to support the achievement of all program and course outcomes.

Details of the library services and other learning resources are covered in Section 2.3 of CMO No. 86 s. 2017.

Section 18. Laboratory Equipment and Resources

18.1 Facilities

Facilities are covered in Section 2.4 5.4 of CMO No. 86 s. 2017

The program shall provide laboratories for the following courses:

1. Chemistry for Engineers
2. Physics for Engineers
3. Electrical Circuits 1, 2
4. Electronic Circuits: Devices and Analysis; Industrial Electronics
5. Electrical Machines 2; Electrical Apparatus and Devices
6. Instrumentation and Control

The program shall also provide computing facilities and licensed software and or freeware for the following courses: computer-aided drafting, computer programming, numerical methods and analysis, power systems analysis, and electrical systems and illumination engineering design.

Refer to **Annex IV** for the minimum laboratory equipment and resources required for the program.

The institution shall provide access to modern tools in EE. Examples of these tools are spreadsheet software, graphing software, mathematical software, statistical software, programming language environment, open or commercial simulation tools in EE, computer-aided circuit analysis design software, illumination engineering and design software, and power system analysis software. These modern tools shall be sufficient so that students can achieve the course outcomes.

18.2 Calibration of Equipment

The program shall ensure that there is a calibration program for all measuring instruments in its laboratories to ensure that they are working according to specifications. The date of the last calibration of each measuring instrument shall be indicated on each instrument.

18.3 Modernization of Equipment and Facilities

Each Department of the college of engineering shall have a program for the continuing modernization and upgrading of its instructional

laboratories, facilities, and equipment. The said program shall have an adequate annual allocation in accordance with the financial capability of the school. Refer to CMO No. 86 s. 2017.

ARTICLE VII
COMPLIANCE OF HEIs

Section 19. Full Compliance with CMO 37 s. 2012

Before the start of AY 2018-2019, all HEIs offering the BSEE program must show evidence of full compliance with CMO 37 s. 2012 (Establishment of an Outcomes-Based Education System) by the following actions:

19.1 CMO 37 Monitoring Workbook and Self-Assessment Rubric

The Commission, through its Regional offices or the TPET Website shall make available to all HEIs currently offering or applying to offer the BS Electrical Engineering program a Monitoring Workbook (CMO 37-MW-2017-HEI-BSEE) and Self-Assessment Rubric (SAR) (CMO-37-HEI-SAR-2017-BSEE).

The five-year BSEE Curriculum shall be the basis of the monitoring. The completed Monitoring Workbook with a List of Supporting Evidences and Self-Assessment Rubric shall be submitted to CHED or online through the CHED TPET website (www.ched-tpet.org) within 30 working days after the effectivity of this CMO. Failure to submit these documents will disqualify the concerned HEIs from continuing or starting their BSEE program in AY 2018-2019.

19.2 Review of Submitted Forms by CHED

CHED shall review the submitted Monitoring Workbooks and Self-Assessment Rubrics, and may schedule monitoring visits to the HEI thereafter. These visits shall determine the extent of compliance of the concerned HEI with CMO 37 s. 2012. HEIs whose BSEE program incurs low SAR total scores shall be asked to submit a one- or two-year development plan to CHED before they shall be allowed to apply to continue their BSEE program for AY 2018-2019.

19.3 Exemptions

HEIs with BSEE programs that have applied as COEs/CODs during AY 2015-2016 and whose applications have been approved as COE or COD shall not be required to comply with Section 19.1 and 19.2. Instead, these HEIs must submit only their proposed four-year curriculum, corresponding curriculum map, and program of study using

the Application Workbook for AY 2018-2019 (AW-2018-HEI-BSEE). See Section 20. Those HEIs whose COD/COE applications were disapproved for AY 2018-2019 must still comply with Sections 19.1 and 19.2.

Section 20. Application Workbook for AY 2018-2019

HEIs that will offer or continue to offer the BSEE program for AY 2018-2019 shall be made to complete a new Application Workbook (AW-2018- HEI-BSEE) which shall be made available through CHED or downloadable from the CHED-TPET website. The Application Workbook shall be completed and submitted to CHED or uploaded to the CHED-TPET website before the start of AY 2018-2019.

Section 21. Approval of Application

All HEIs whose BSEE program has a COE or COD status and has submitted the completed Application Workbook shall automatically receive certifications from CHED and shall be given approval to implement their BSEE program beginning AY 2018-2019.

Other concerned HEIs which have submitted their CMO Monitoring Workbook, Self-Assessment Rubrics, and Application Workbook shall be given conditional approval by CHED to start offering their new BSEE Curriculum following this CMO effective AY 2018-2019. However, CHED shall conduct monitoring of HEIs to assure complete compliance of this PSG within the transitory period, during which the HEI whose implementation of the BSEE program is weak shall be required to submit developmental plans.

ARTICLE VIII

TRANSITORY, REPEALING and EFFECTIVITY PROVISIONS

Section 22. Transitory Provision

All private HEIs, state universities and colleges (SUCs) and local universities and colleges (LUCs) with existing authorization to operate the BSEE program are hereby given a period of **three (3) years** from the effectivity thereof to fully comply with all the requirements in this CMO. However, the prescribed minimum curricular requirements in this CMO shall be implemented starting AY 2018-2019.

Section 23. Repealing Clause

Any provision of this Order, which may hereafter be held invalid, shall not affect the remaining provisions.

All CHED issuances or part thereof inconsistent with the provisions in this CMO shall be deemed modified or repealed.

Section 24. Effectivity Clause

This CMO shall take effect fifteen (15) days after its publication in the Official Gazette or in a newspaper of general circulation. This CMO shall be implemented beginning **AY 2018-2019.**

Quezon City, Philippines December 4, 2017

For the Commission:

PATRICIA B. LICUANAN, Ph.D.

Chairperson

Attachments:
Annex I – Competency Standards
Annex IA – IEA Graduate Attributes and Professional Competencies
Annex II – Minimum Program Outcomes and a Sample Curriculum Map
Annex III – Sample Course Specifications
Annex IV – Recommended Laboratory Equipment
A. Natural/Physical Sciences
B. Professional Courses
Annex V – Sample Course Syllabus

COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY
City Campus
Second Semester, Academic Year 2021-2022

Outcomes Based-Education (OBE) Syllabus in Math 112
Calculus 2
Course Credit: 5.0 units**(90hrs)**

Institutional Vision, Mission, and Goals

Vision:
An innovative and technologically-advanced State College in Caraga.

Mission:
To provide relevant,

a. high quality and sustainable instruction,
b. research, production and extension programs and
c. services within a culture of credible and responsive institutional governance.

Goals:

1. Foster application of the discipline and provide its learner with industry-based training and education particularly in engineering, technology and fisheries.
2. Conduct and utilize studies for the development of new products, systems and services relevant to Philippine life and of the global village.
3. Promote transfer of technology and spread useful technical skills, thus empowering its learners and their activities.

SSCT Core Values

Service-Oriented **S**ocially Responsive **C**ommitted **T**ransformational

SSCT Quality Policy

Surigao State College of Technology provides quality instruction, research, extension programs and production services to satisfy its customers by responding to their needs and expectations and continually improving its quality management system.

Institutional Graduate Attributes (IGA) :

- Visionary Leader
- Effective Communicator
- Competent Technologist
- Self-Directed Lifelong Learner

Program Goals

The Electrical Engineering program aims to design and apply the generation, transmission, and distribution of electrical energy to produce competent engineers that exhibit positive work ethics and flexibility in work conditions for the development of Caraga.

ProgramEducational Objectives (PEO) and Relationship to Institutional Mission

Program Educational Objectives (PEO)	Mission		
	a	b	c
EE-PEO1. Demonstrate professionalism in electrical engineering and apply professional ethics thru communication and collaboration.	✓	✓	✓
EE-PEO2. Use appropriate techniques, resources, and modern tools necessary for analysis, design, and modelling of complex electrical systems	✓	✓	✓
EE-PEO3. Plan, lead, and implement designated tasks, interact with other engineering professionals, and take leadership roles in electrical engineering organization.	✓	✓	✓
EE-PEO4. Engage in lifelong learning able to discover new opportunities for continuing personal and professional development in electrical engineering	✓	✓	✓

Program Outcomes (PO) and Relationship to Program Educational Objectives (PEO)

Program Outcomes (PO)	Program Educational Objectives (PEO)			
	1	2	3	4
EE-POa.Apply knowledge of mathematics and sciences to solve complex engineering problems	✓	✓	✓	✓
EE-POb.Develop and conduct appropriate experimentation, analyze and interpret data				
EE-POc.Design a system, component, or process to meet desired needs within				

realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards				
EE-POd.Function effectively on multi-disciplinary and multi-cultural teams that establish goals, plan tasks, and meet deadlines				
EE-POe.Identify, formulate, and solve complex problems in electrical engineering				
EE-POf.Recognize ethical and professional responsibilities in engineering practice				
EE-POg.Communicate effectively with a range of audiences				
EE-POh.Understand the impact of engineering solutions in a global, economic, environmental, and societal context				
EE-POi.Recognize the need for additional knowledge and engage in lifelong learning				
EE-POj.Articulate and discuss the latest developments in the field of electrical engineering				
EE-POk.Apply techniques, skills, and modern engineering tools necessary for electrical engineering practice				
EE-POl.Demonstrate knowledge and understanding of engineering and management principles as a member and/or leader in a team to manage projects in multidisciplinary environments				

Course Description

This course introduces the concept of integration and its application to physical problems such as evaluation of areas, volumes of revolution, force, and work; fundamental formulas and various techniques of integration applied to both single variable and multi-variable functions; tracing of functions of two variables.

DACUM Main Duties (DMD)

EE-DMD1. Diagnose electrical problems using the electrical diagrams or blue print (as built electrical plans)
EE-DMD2. Install, repair, and maintenance electrical power systems(building wiring, controls, electrical machines and transformers)
EE-DMD3. Facilities Manager
EE-DMD4. Power Plant Manager
EE-DMD5. Electrical Researchers, Professor and Faculty

Course Outcomes (CO) and Relationship to Program Outcomes (PO)

Program Outcome (PO) /Level	Course Outcomes (CO)	Assessment Task (CO-AT)	DACUM Links				
			1	2	3	4	5
EE-POa *Introductory* Apply knowledge of mathematics and sciences to solve complex engineering problems;	*Math112-CO1*: Apply the various integration concepts and techniques in both single and multiple integrals to solve complex engineering problems.	Students will solve a set of engineering problems using integration concepts and techniquesfor both single and multiple integrals. Criteria – 70% correct answers and solution Total Points: 100 points					✓

Course Outcomes (CO) and Relationship to Intended Learning Outcomes (ILO)

Course Outcomes (CO)	Intended Learning Outcomes (ILO)
Math112-CO1: Apply the various integration concepts and techniques in both single and multiple integrals to solve complex engineering problems.	*Math112-ILO1*: Evaluate integrals using the concepts and formulas of integration. (Math112-CO1) *Math112-ILO2*: Evaluate integrals using the various techniques of integration. (Math112-CO1) *Math112-ILO3*: Evaluate definite integrals. (Math112-CO1) *Math112-ILO4*: Evaluate improper integrals. (Math112-CO1) *Math112-ILO5*: Calculate various applications of definite integrals. (Math112-CO1) *Math112-ILO6*: Analyzemultiple integration and evaluate its various applications. (Math112-CO1)

Detailed Course Content

Intended Learning Outcomes (ILO)	Topics	Time Frame	Teaching and Learning Activities(TLA)	Assessment Tasks (ILO-AT)	Target	Resources	Values Integration	Remarks
Math112-ILO1: Evaluate integrals using the concepts and formulas of integration. (Math112-CO1)	**1. INTEGRATION CONCEPT/FORMULAS** *1.1. Basic Rules/Formulas ofIndefinite Integration for Some Algebraic Functions* *1.2. Indefinite Integration of Some Transcendental Functions*	21 hrs.	Learning Module 1 *Asynchronous*	Online quiz and problem set on integration concepts and formulas	70% of the students shall have a rating of at least 3.0	Videos online, modules, e-books, and worksheets	Core Value: *Committed* Sub-Value: *Determined application of integration formulas in evaluating integrals*	
Math112-ILO2: Evaluate integrals using the various techniques of integration. (Math112-CO1)	**2. INTEGRATION TECHNIQUES** *2.1. Integration by Parts* *2.2. Integration by Substitution* *2.3. The Methods of Partial Fraction*	23 hrs.	Learning Module 2 *Asynchronous*	Online quiz and problem set on integration techniques	70% of the students shall have a rating of at least 3.0	Videos online, modules, e-books, and worksheets	Core Value: *Committed* Sub-Value: *Determined application of integration techniques in evaluating integrals*	
MIDTERM EXAMINATION– 2.0 Hrs.								
Math112-ILO3: Evaluate definite integrals.	**3. DEFINITE INTEGRALS**	5.0 hrs.	Learning Module 3 *Asynchronous*	Assignment and problem set on	70% of the students	Videos online, modules, e-	Core Value: *Transformational*	

(Math112-CO1)	3.1. *Definite Integral* 3.2. *Fundamental Properties of Definite Integrals* 3.3. *Walli's Formula*			definite integrals	shall have a rating of at least 3.0	books, and worksheets	Sub-Value: *Adaptive evaluation of definite integrals*	
Math112-ILO4: Evaluate improper integrals. (Math112-CO1)	**4. IMPROPER INTEGRALS** 4.1. *Definition* 4.2. *Convergence of Improper Integrals*	5.0 hrs.	Learning Module 4 *Asynchronous*	Online quiz and problem set on improper integrals	70% of the students shall have a rating of at least 3.0	Videos online, modules, e-books, and worksheets	Core Value: *Committed* Sub-Value: *Determined evaluation of improper integrals*	
Math112-ILO5: Calculate various applications of definite integrals. (Math112-CO1)	**5. APPLICATIONS OF DEFINITE INTEGRALS** 5.1. *Plane Area* 5.2. *Areas between Curve* 5.3. *Other Applications*	20 hrs.	Learning Module 5 *Asynchronous*	Online quiz and problem set on the application of definite integrals	70% of the students shall have a rating of at least 3.0	Videos online, modules, e-books, and worksheets	Core Value: *Committed* Sub-Value: *Perseverant in solving applications of definite integrals*	
Math112-ILO6: Analyze multiple integration and evaluate its various applications. (Math112-CO1)	**6. MULTIPLE INTEGRATION AND ITS APPLICATION** 6.1. *Double Integrals* 6.2. *Triple Integrals* 6.3. *Surfaces Tracing*	13 hrs.	Learning Module 6 *Asynchronous*	Online quiz and problem set on multiple integration and its application	70% of the students shall have a rating of at least 3.0	Videos online, modules, e-books, and worksheets	Core Value: *Transformational* Sub-Value: *Optimistic evaluation of multiple integration and its application*	
FINAL EXAMINATION – 2.0 Hrs.								

References:

Stewart, J., Clegg, D. K., & Watson, S. (2020). *Calculus: early transcendentals*. Cengage Learning
Larson, R. & Edwards, B. (2019).*Calculus* (11th ed). BROOKS/COLE.
Hughes-Hallett, D., Lock, P. F., Gleason, A. M., Flath, D. E., Gordon, S. P., Lomen, D. O., ... & Tucker, T. W. (2017). *Applied Calculus*.John Wiley & Sons.
Berresford and Rockett (2016).*Applied Calculus* 7th ed.Cengage Learning
Krishna's Text Book on Integral Calculus. 26th ed. Krishna Prakashan Media Pvt Ltd. (2020)

Course Requirements:

- Portfolio of solved problem sets in calculus 2(CO-AT1)
- Quizzes and Assignments
- Midterm and Final exams

Course Evaluation:

Criteria	Lecture Grade
➢ Quizzesand online outputs/interaction (ILO-AT)	25%
➢ Performance Tasks (CO-AT)	35%
➢ Major Exams (Midterm and Final)	40%
TOTAL	**100%**

Grade Computation: $\frac{Midterm\ Grade + Final\ Grade}{2} = Average\ Grade$

Grade Point	Description
1.0	Excellent
1.5 – 1.1	Very Good
2.0 – 1.6	Highly Satisfactory
2.5 – 2.1	Good
2.9 – 2.6	Satisfactory
3.0	Passing
5.0	Failed due to poor performance, absences, withdrawal without notice
DRP	Dropped with approved dropping slip
INC	Incomplete requirements but w/ passing class standing. INC is for non-graduating students only
NG	No Grade

Source: *SSCT Student Handbook*

Course Policies:

1. Attendance shall be checked in every class session in the Google Meet. This is to monitor the absences incurred by the students in terms of the allowable number of absences for a course as stipulated in the Student Handbook.
2. During online classes, video camera shall be turned on all the time and microphone shall be turned off. The microphone shall be unmuted only if the student's name is called to participate in class discussion.
3. Major examinations in multiple-choice type shall be done online. For problem solving type, detailed solutions shall be written legibly in separate sheets of paper and shall be converted to pdf form prior to submission.
4. Cheating in major examinations which include attempts to defraud, deceive, or mislead the instructor in arriving at an honest assessment shall entail zero score.
5. Plagiarism which is a form of cheating that involves presenting the ideas or work of another as one's own work shall entail zero score.
6. Projects shall be submitted on or before the deadline. Students who submit unsatisfactory projects shall be given the chance to improve their works on the condition that they resubmit the revised outputs on the date set by the instructor. Non-submission of a project on the deadline shall entail zero score.
7. An INC grade shall be given to students who fail to submit the course requirements of at least 95% of the projects and quizzes or failure to take the major examinations.

Revision History:

Revision No.	Revised by	Date of Revision	Date of Implementation	Highlight of Revision
1	Engr.Andy Bong F. Navarro	December 5, 2020	1st Sem, AY 2020-2021	Followed OBTL Format as per CMO #101 S. 2017
2	Engr. Mark Marvin D. Paglinawan Engr. Vernon V. Liza	January 24, 2021	Feb 7, 2022	DACUM Workshop vis-à-vis CMO No. 101 S. 2017

Prepared by:

ENGR. MARK MARVIN D. PAGLINAWAN
Guest Lecturer

ENGR. VERNON V. LIZA
Guest Lecturer

Date: 1-25-2022

Checked and reviewed by:

ENGR. VICENTE Z. DELANTE, MEng'g
Program Chair, BSEE

Date: 1-28-2022

Noted by:

ENGR. ROBERT R. BACARRO, MECE, MBA
Dean, CEIT

Date: 1-28-2022

Recommended by:

RONITA E. TALINGTING, PhD
Campus Director

Date: 1-31-2022

Approved by:

EMMYLOU A. BORJA, EdD
VP for Academic Affairs

Date: 1-31-2022

COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY
City Campus
First Semester, Academic Year 2021-2022

Outcomes Based-Education (OBE) Syllabus in IC 102
INTRODUCTION to ELECTRICAL ENGINEERING
Course Credit: 3.0 unit (54 hrs.)

Institutional Vision, Mission, and Goals

Vision:
An innovative and technologically-advanced State College in Caraga.

Mission:
To provide relevant,
a. high quality and sustainable instruction,
b. research, production and extension programs and
c. services within a culture of credible and responsive institutional governance.

Goals:
1. Foster application of the discipline and provide its learner with industry-based training and education particularly in engineering, technology and fisheries.
2. Conduct and utilize studies for the development of new products, systems and services relevant to Philippine life and of the global village.
3. Promote transfer of technology and spread useful technical skills, thus empowering its learners and their activities.

SSCT Core Values

Service-Oriented **S**ocially Responsive **C**ommitted **T**ransformational

SSCT Quality Policy

Surigao State College of Technology provides quality instruction, research, extension programs and production services to satisfy its customers by responding to their needs and expectations and continually improving its quality management system.

Institutional Graduate Attributes (IGA) :

- **V**isionary Leader
- **E**ffective Communicator
- **C**ompetent Technologist
- **S**elf-Directed Lifelong Learner

Program Goals

The *Electrical Engineering* program aims to design and apply the generation , transmission, and distribution of electrical energy to produce competent engineers that exhibit positive work ethics and flexibility in work conditions for nations greater heights.

Program Educational Objectives (PEO) and Relationship to Institutional Mission

Program Educational Objectives (PEO)	Mission		
	a	b	c
EE-PEO1. Demonstrate professionalism in electronical engineering and apply professional ethics thru communication and collaboration.	/	/	/
EE-PEO2. Use appropriate techniques, resources, and modern tools necessaryfor analysis, design, and modelling of complex electrical systems	/	/	/
EE-PEO3. Plan, lead, and implement designated tasks, interact with other engineering professionals, and take leadership roles in electrical engineering organization	/	/	/
EE-PEO4. Engage in lifelong learning able to discover new opportunities for continuing personal and professional development in electrical engineering	/	/	/

Program Outcomes (PO) and Relationship to Program Educational Objectives (PEO)

Program Outcomes (PO)	Program Educational Objectives (PEO)			
	1	2	3	4
EE-POa. Apply knowledge of mathematics and science to solve engineering Problems				
EE-POb. Design and conduct experiments, as well as to analyse and interpret Data				
EE-POc. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political,	/	/	/	/

ethical, health and safety, manufacturability, and sustainability, in accordance with standards				
EE-POd. Function on multidisciplinary teams				
EE-POe. Identify, formulate, and solve engineering problems				
EE-POf. Apply professional and ethical responsibility				
EE-POg. Communicate effectively				
EE-POh. Identify the impact of engineering solutions in a global, economic, environmental, and societal context	/	/	/	/
EE-POi. Recognition of the need for, and an ability to engage in life-long learning				
EE-POj. Apply knowledge of contemporary issues				
EE-POk. Use techniques, skills, and modern engineering tools necessary for engineering practice				
EE-POl. Apply knowledge of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments	/	/	/	/
EE-POm. Understand at least one specialized field of electronical engineering Practice				

Course Description

This is the capstone course which utilizes the fundamentals of electrical engineering in the design of an electrical system. It includes the synthesis of processes, analysis of process conditions and the analytic, heuristic and optimum design of equipment and processes. Economic analysis is included to estimate the cost of equipment, capital investment, total product cost and profitability.

DACUM Main Duties (DMD)

EE-DMD1. Design, review, and redesign schematic diagrams, plan layout, and execution plan
EE-DMD2. Approve the system operation as per approved project specification
EE-DMD3. Oversee project implementation
EE-DMD4. Site survey
EE-DMD5. Coordinate with team members

Course Outcomes (CO) and Relationship to Program Outcomes (PO)

Program Outcome (PO) / Level	Course Outcomes (CO)	Assessment Task (CO-AT)	DACUM Links				
			1	2	3	4	5
EE-POi *Introductory* Engage in lifelong learning able to discover new opportunities for continuing personal and professional development in electrical engineering	*IC !02 -COi*: Able to discover and learn new opportunities in continuing personal and professional development in electrical engineering	Students are given insights to discover the opportunities of an electrical engineering graduates. Criteria – Sights opportunities in line to course program they are currently enrolled Total: 80 points	/			/	
EE-POj *Introductory* Apply knowledge of contemporary issues	*IC 102 -COj*: Identify societal problems that needs electrical engineering solution.	Students do a societal scanning of real-world problems that needs electrical engineering solution. This is an individual scanning were each student will proposed solution using electrical engineering technology. Criteria – Realistic problem, Innovation and Technology Total: 80 points			/		
EE-POm *Introductory*	*IC 102-COm*: Select one specialized field of electrical engineering to develop into			/			/

. Understand at least one specialized field of electrical engineering practice	a field of expertise	The student hone the special skills on the chosen specialized field to get expertise and skills of the selected field of electrical engineering practice. Criteria – Student can create a road map of achieving the success off the selected specialize field of electrical engineering practice. Total: 80 points					

Course Outcomes (CO) and Relationship to Intended Learning Outcomes (ILO)

Course Outcomes (CO)	Intended Learning Outcomes (ILO)
EE 10C-CO1: Able to discover and learn new opportunities for continued personal and professional development in electrical engineering	*EE 102-ILO4*: . Recognition of the need for, and an ability to engage in life-long Learning. (EE 102-CO1)
EE102-CO2: Identify societal problems that needs electrical engineering solution.	*EE102 - ILO1*: Identify real-world problems. (EE102 - CO2)
EE102-CO3: Select one specialized field of electrical engineering to develop into a field of practice.	*EE102-ILO2*: Understand at least one specialized field of electronical engineering Practice

Detailed Course Content

Intended Learning Outcomes (ILO)	Topics	Time Frame	Teaching and Learning Activities (TLA)	Assessment Tasks (ILO-AT)	Target	Resources	Values Integration	Remarks
EE 102-ILO1: Able to discover and learn new opportunities in continuing personal and professional development in electrical engineering (EE102-CO2)	**1.0 Beginning of Electrical Engineering** **1.1 History of Electrical Engineering** **1.2 Definition of Electrical Engineering** **1.3 Importance of Electrical Engineering**	4.0 hrs	Pair critiquing on Discovered and new opportunities in continuous personal and professional development in electrical engineering. *Synchronous* Learning Module 1 *Asynchronous*	Quiz on the topic being discuss	10% of the students shall have a rating of at least 3.0	Handouts and modules	Core Value: *Committed* Sub-Value: *Eagerness to learn he beginning, definition of electrical engineering and its importance.*	
EE 102 -ILO2: Able to discover and learn new opportunities in continuing personal and professional development in electrical engineering (EE 102-CO3)	**2. Highest Paying Engineering Jobs** *2.1 Jobs of an Electrical Engineers* *2.2 Fields of an Electrical Engineers* *2.3 Typical Job Titles of an Electrical Engineer*	5.0 hrs	Module *Synchronous* Learning Module 2 *Asynchronous*	Graded oral presentation on the presentation on electrical engineering jobs, field of works of an electrical engineer	80% of the students shall have a rating of at least 3.0	Website in highest engineering jobs	Core Value: *Transformational* Sub-Value: *Accept the reality on the jobs in various fields of an electrical practice*	

EE 102-ILO3: Select one specialized field of electrical engineering to develop into a field of practice. (EE102 -CO3)	**3. Course Topics in an Electrical Engineering Studies**	4.0 hrs	Module *Synchronous* Learning Module 3 *Asynchronous*	Q & A about on the various courses in electrical engineering	20% of the students shall have a rating of at least 3.0	Website in course project topics of an electrical engineering studies	Core Value: *Service oriented* Sub-Value: *Realization of the courses in electrical engineering*	

EE102 -ILO4: *EE102-ILO2*: Understand at least one specialized field of electronical engineering Practice	**4. Salaries and Intangible Rewards on the Electrical Engineering Practice**	2.0 hrs	Module *Synchronous* Learning Module 4 *Asynchronous*	Graded project presentation on the various salaries and intangible rewards in electrical engineering practice.	10% of the students shall have a rating of at least 3.0	Video clip on salaries and rewards in electrical engineering practice	Core Value: *Transformational* Sub-Value: *Initiative to select a special field in the study of electrical engineering*	
Midterm Exam – 2.0 Hr.								
EE102-ILO1: Able to discover and learn new opportunities in continuing personal and professional development in electrical engineering. (EE102-CO1)	**5. Basic Presentation and Discussion on Electrical Engineering Quantities, Terms and Measurements**	8.0 hrs	Module *Synchronous* Learning Module 5 *Asynchronous*	Quiz on the presentation and discussion on various electrical engineering quantities, terms and measurements	20% of the students shall have a rating of at least 3.0	Website on basic presentation and discussion of electrical engineering quantities, terms and measurement	Core Value: *Socially responsive* Sub-Value:	
EE102-ILO1: Design the research journal for presentation in research conference. (EE102-CO1)	**7. ENGINEERING RESEARCH JOURNAL** *7.1 IEEE Citation* *7.2 IEEE Research Journal*	8.0 hrs	Participate on the discussion in crafting a capstone project and research journal *Synchronous* Learning Module 7	Graded participation in the presentation of mini research	40% of the students shall have a rating of at least 3.0	Website in IEEE research journal	Core Value: *Committed* Sub-Value: *Integrity in writing research*	

			Asynchronous				*journal*	
Final Submission of the Course Work								

References:

Books

1. Opportunities in Engineering Careers by Nicholas Basta; published by VGM Career Horizons (VGM opportunities series)
2. Energy, Electricity and Electronics - Applied Activities by Rex Miller and Fred W. Culpepper, Jr.; published by Mcknight & Mcknight publishing company.
3. Electrical Projects for the School and Home Workshop by Walter B. Ford; published by The Bruce Publishing company.
4. Basic Electricity/Electronics - Motors & Generators - How they work by Training & Retraining, Inc.; published by Howard W. Sams & Co., Inc.
5. Industrial Electronics - Devices, Circuits and Applications by Edward F. Driscoll; published by American Technical Society.

Course Requirements:

Course Evaluation:

Criteria	Lecture Grade
➢ Quizzes and online outputs/interaction (ILO-AT)	25%
➢ Performance Tasks (CO-AT)	35%
➢ Project Proposal (Midterm and Final)	40%
TOTAL	**100%**

Grade Computation: $\frac{Midterm\ Grade + Final\ Grade}{2} = Average\ Grade$

Grade Point	Description
1.0	Excellent
1.5 – 1.1	Very Good
2.0 – 1.6	Highly Satisfactory
2.5 – 2.1	Good
2.9 – 2.6	Satisfactory
3.0	Passing
5.0	Failed due to poor performance, absences, withdrawal without notice
DRP	Dropped with approved dropping slip
INC	Incomplete requirements but w/ passing class standing. INC is for non-graduating students only
NG	No Grade

Source: *SSCT Student Handbook*

Course Policies:

1. Attendance shall be checked in every class session in the Google Meet. This is to monitor the absences incurred by the students in terms of the allowable number of absences for a course as stipulated in the Student Handbook.
2. During online classes, video camera shall be turned on all the time and microphone shall be turned off. The microphone shall be unmuted only if the student's name is called to participate in class discussion.
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4. Cheating in major examinations which includes attempts to defraud, deceive, or mislead the instructor in arriving at an honest assessment shall entail zero score.
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6. Projects shall be submitted on or before the deadline. Students who submit unsatisfactory projects shall be given the chance to improve their works on the condition that they resubmit the revised outputs on the date set by the instructor. Non-submission of a project on the deadline shall entail zero score.
7. An INC grade shall be given to students who fail to submit the course requirements of at least 95% of the projects and quizzes or failure to take the major examinations.

Revision History:

Revision No.	Revised by	Date of Revision	Date of Implementation	Highlight of Revision
1	Engr Vicente Z. Delante	August 2021	September 2021	Followed OBTL Format as per CMO #101 S. 2017
				DACUM Workshop vis-à-vis CMO No. 101 S. 2017

Prepared by:

ENGR. Vicente Z. Delante
Asst. Prof. 111

Date: 1-25-2022

Checked and reviewed by:

ENGR. Vicente Z. Delante
Program Chair, BSEE

Date: 1-28-22

Noted by:

ENGR. ROBERT R. BACARRO, MECE, MBA
Dean, CEIT
Date: 1-28-2022

Recommended by:

DR RONITA E. TALINGTING
Campus Director
Date: 1-31-2022

Approved by:

EMMYLOU A. BORJA, EdD
VP for Academic Affairs
Date: 1-31-2022

COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY
1st Semester, Academic Year 2019-2020

COURSE SYLLABUS in EE 101 – CIRCUIT 1

Institutional Vision, Mission, and Goals

SSCT Vision:

An innovative, technologically-advanced State College in Caraga.

SSCT Mission:
To provide relevant, high quality and sustainable instruction, research, production and extension programs and services within a culture of credible and responsive institutional governance.

SSCT Goals:

1. Foster application of the discipline and provide its learner with industry-based training and education particularly in engineering, technology and fisheries.
2. Conduct and utilize studies for the development of new products, systems and services relevant to Philippine life and of the global village.
3. Promote transfer of technology and spread useful technical skills, thus empowering its learners and their activities.

Institutional Intended Learning Outcomes

: SSCT graduates are expected to:

1. Innovation and technical skills;
2. Exhibit critical thinking collaboration, and communication;
3. Manifest leadership, adaptability and responsibility.

Programs Goals:	The Electrical Engineering program aims to design and apply the generation, transmission, and distribution of electrical energy to produce competent engineers that exhibit positive work ethics and flexibility in work conditions for the development of Caraga.
Programs Educational Objectives:	The BS Electrical Engineering program is geared towards producing graduates who have the following attributes within three to five years from graduation: 1. Graduates demonstrate technical expertise and practical skills in the field of electrical engineering. 2. Graduates demonstrate flexibility in working with multidisciplinary teams and apply professional and ethical responsibility in the practice of electrical engineering. 3. Graduates are engaged in lifelong learning and knowledgeable in contemporary issues relevant to the field of electrical engineering.
Program Outcome(s)	Upon the completion of the course, the students must able to: a. Apply knowledge of mathematics and sciences to solve complex engineering problems; - **enabling** b. Develop and conduct appropriate experimentation, analyze and interpret data; - **demonstrate** c. Function effectively on multi-disciplinary and multi-cultural teams that establish goals, plan tasks, and meet deadlines; - **enabling** d. Communicate effectively with a range of audiences; - **demonstrate** e. Apply techniques, skills, and modern engineering tools necessary for electrical engineering practice; - **enabling** f. Demonstrate knowledge and understanding of engineering and management principles as a member and/or leader in a team to manage projects in multi-disciplinary environment. - **demonstrate**
Course Code	EE 101
Course Title	CIRCUIT 1
Course Credit	3 units lecture, 1 unit laboratory
Pre-requisites/Co-requisites	Physics 102, MATH 107

Course Description: This is a 3-unit course covers the basic concepts and fundamental laws of electrical circuit theory; analysis and application of series, parallel and series-parallel resistive circuits; mesh and nodal analysis theorems; characteristics of inductors and capacitors; analysis of RL, RC, and RLC circuits with excitation.

Course Intended Learning Outcomes At the end of the course, the students should be able to:

Detailed Course Syllabus

Intended Learning Outcome	Topics	Time Frame	Teaching and Learning Activities	Assessment Tasks	Resources	Values Integration	References	Remarks
Express understanding of the Vision and Mission statements of SSCT, including its Goals and Objectives; Analyze the syllabus by looking into the ILOs, Subject Matter, TLAs, Assessment Strategies, Values and References; and Design strategies that will help meet the requirements and obtain desired grades/marks for the course	**ORIENTATION ON THE COURSE** **VMGO** **Syllabus** **Grading System**	**1 hr**	*Big Group Discussion* on VMGO *Documentary Analysis* of Syllabus and Grading System *Concept Mapping (Sunflower Map/Fishbone Map)* on strategies to meet course requirements		Computer/ Projector for Power point presentation of the VMGO Syllabus	Obedience, Punctuality, Diligence	Student Handbook	
Identify basic electrical quantities, electrical units,	**1. BASIC ELECTRICAL QUANTITIES SYSTEM OF**	4 hrs.	*Small Group Discuss* on electrical quantities, electrical units and	*Problem set Compilation* on the Basic Electrical	Whiteboard Marker Handouts	Appreciating the complex of the lesson	Alexander C. & Sadiku M. 4th Edition	

and electrical components Identify and solve Ohm's Law and Kirchhoff's Law	**UNITS; CIRCUIT COMPONENTS** **2. OHM'S LAW AND KIRCHHOFF'S LAWS**	4 hrs.	components *Small Group Discuss* on the Ohm's Law and Kirchhoff's Law	Quantities system of units; Circuit components as well as Ohm's Law and Krchhoff's Laws			(2009) Charles Alexander, Matthew Sadiku-Fundamentals of Electric Circuits (2012, McGraw-Hill Science-Engineering Math)	
Identify and Analyze Series-Parallel Circuits Solve complex Series-Parallel Circuits Problems Learn the application of different types of circuits	**3. ANALYSIS OF SERIES, PARALLEL, SERIES-PARALLEL CIRCUITS** **4. APPLICATIONS OF RESISTIVE CIRCUITS-RESISTANCE BRIDGE CIRCUITS; BIASING CIRCUITS VOLTAGE DIVIDER CIRCUITS; ANALOG METERS**	4 hrs. 4 hrs. 2 hrs.	*Small group discussion and Brainstorming:* Analyze Series-Parallel Circuits and problems *Hands-on Laboratory Activity* on Applications of resistive circuits-resistance bridge circuits.	*Problem set Compilation* on the Analysis of resistive circuits with controlled sources and network theorems Rubrics: Accuracy: 40 Timeliness 30 Attitude/teamwork 30 TOTAL 100	Whiteboard Marker Handouts	Self-confidence in understanding and appreciating the lesson	Alexander C. & Sadiku M. 4th Edition (2009) Charles Alexander, Matthew Sadiku-Fundamentals of Electric Circuits (2012, McGraw-Hill Science-Engineering Math)	
Analyze and Solve complex	**5. ANALYSIS OF RESISTIVE**	4 hrs.	*Small group discussion and*	*Problem set Compilation*	Whiteboard Marker	Awareness in dealing	Alexander C. & Sadiku M.	

Series-Parallel Circuits problems with controlled sources Analyze and Solve Complex Series-Parallel Circuits problems with controlled sources using circuit analysis techniques and network theorems such as Thevenin and Norton Theorems	**CIRCUITS WITH CONTROLLED SOURCES** **6. CIRCUIT ANALYSIS TECHNIQUES AND NETWORK THEOREMS**	4 hrs. 2 hrs.	*Brainstorming:* on Series-Parallel Circuits problems and network theorems of Thevenin and Norton Laws *Hands-on Laboratory Activity* on Circuit analysis techniques and network theorems	on the Analysis of resistive circuits with controlled sources and network theorems Rubrics: Accuracy: 40 Timeliness 30 Attitude/teamwork 30 TOTAL 100	Handouts	with the difficulties in lesson	4th Edition (2009) Charles Alexander, Matthew Sadiku-Fundamentals of Electric Circuits (2012, McGraw-Hill Science-Engineering Math)	
MIDTERM EXAMINATION (3 hours)								
Identify Inductors and Capacitors Analyze the DC response of Inductors and capacitors	**7. FUNDAMENTALS OF INDUCTORS AND CAPACITORS**	8 hrs. 2 hrs.	*Small group discussion and Brainstorming:* on characteristics of internal forces in rigid bodies, proper plotting and labelling of structural members *Hands-on Laboratory Activity* on inductors and	*Problem set Compilation* on the Internal Forces Rubrics: Accuracy: 40 Timeliness 30	Whiteboard Marker Handouts	Self-confidence in understanding and appreciating the lesson	Alexander C. & Sadiku M. 4th Edition (2009) Charles Alexander, Matthew Sadiku-Fundamentals of Electric Circuits (2012,	

			capacitors	Attitude/teamwork 30 TOTAL 100			McGraw-Hill Science-Engineering Math)	
Identify and Analyze first order dynamic circuits Solve complex problems	**8. ANALYSIS OF FIRST ORDER DYNAMIC CIRCUITS WITH DC EXCITATION**	8 hrs 2 hrs.	*Small group discussion and Brainstorming:* on First order dynamic circuits and complex problems *Hands-on Laboratory Activity* on first order dynamic circuit with DC excitation	*Problem set Compilation* on the Analysis of first order dynamic circuits with DC excitation Rubrics: Accuracy: 40 Timeliness 30 Attitude/teamwork 30 TOTAL 100	Whiteboard Marker Handouts	Self-confidence in understanding and appreciating the lesson	Alexander C. & Sadiku M. 4th Edition (2009) Charles Alexander, Matthew Sadiku-Fundamentals of Electric Circuits (2012, McGraw-Hill Science-Engineering Math)	
Analysis and solve complex second order dynamic circuits	**9. ANALYSIS OF SECOND-ORDER DYNAMIC CIRCUITS WITH DC EXCITATION**	8 hrs. 2 hrs.	*Small group discussion and Brainstorming:* on the Analysis and complex second order dynamic circuits *Hands-on Laboratory Activity* on second order dynamic circuit with	*Problem set Compilation* on the Analysis of Second-order Dynamic Circuits with DC Excitation Rubrics: Accuracy: 40 Timeliness 30 Attitude/teamwork 30	Whiteboard Marker Handouts	Self-confidence in understanding and appreciating the lesson	Alexander C. & Sadiku M. 4th Edition (2009) Charles Alexander, Matthew Sadiku-Fundamentals of Electric Circuits (2012, McGraw-Hill Science-	

			DC excitation	TOTAL 100			Engineering Math)	
FINAL EXAMINATION (3 hours)								

Course Requirements:

- Individual Reports
- Graphic Organizers
- Group Project
- Midterm & Final Examination

Grading System:

Criteria: Academic Subjects	Lecture Grade	Laboratory Grade
➢ Quizzes/ Problem Sets	20%	
➢ Project	30%	
➢ Laboratory Exercises		50%
➢ Laboratory Reports		50%
➢ Major Examination	50%	___
TOTAL	100%	100%

Grade Point	Description
1.0	Excellent
1.5 – 1.1	Very Good
2.0 – 1.6	Highly Satisfactory
2.5 – 2.1	Good
2.9 – 2.6	Satisfactory
3.0	Passing
5.0	Failed due to poor performance, absences, withdrawal without notice
DRP	Dropped with approved dropping slip
INC	Incomplete requirements but w/ passing class standing. INC is for non-graduating students only

Source: *SSCT Student Handbook*

Course Policies:

1. Attendance sheet will be passed around and the student is responsible to sign to prove his/her presence for that sessions. This is to monitor whether absences incurred by the student is still within the allowed number of absences for a course stipulated in the Student Handbook.
2. Excuse from the class will only be honored if a Memo from the school is issued before the absence or valid excuse letter from parents/guardians is presented after the absence. No other excuses will be entertained.
3. It is a part of your education to learn responsibility and self-discipline, particularly with regards to academic honesty. Cheating is defined to include an attempt to defraud, deceive, or mislead the instructor in arriving at honest grade assessment. Plagiarism is a form of cheating that involves presenting as one's own work the ideas or work of another. Therefore, all portions of any test, project, or major examination submitted by you for a grade must be your own work, unless you are instructed to work collaboratively. Cheating in a major course examination by a student will entail a failing mark for the given course. Plagiarism in papers and other works will entail zero score for the said requirement.
4. The use of multiple choice questionnaires is used during the exams. However, detailed solution to the problem should be written legibly in a clean long size bond paper.
5. Unsatisfactory project will not be accepted. However, the student/group will be given a chance to improve their project. Non-submission of the project on the set deadline means an automatic final grade of 5.
6. Exemptions from taking the final examination are as follows: (1) No exam below 60%, (2) No missed quizzes/exams, (3) Laboratory reports are submitted on the specified date, (4) The project is submitted on the specified deadline, and (5) Absences do not exceed the maximum allowed.
7. This class policy serves as our written agreement for the whole semester.

Prepared by:

ENGR. VERNON V. LIZA
Faculty
Date: Aug 4, 2019

Checked and Reviewed by:

ENGR. JOSELITO S. BALDAPAN, PEE
Program Chair, BSEE
Date: Aug 5, 2019

ENGR. DARWIN C. MANGCA
Program Chair, BSECE
Date: Aug 5, 2019

ENGR. ANALYN S. MORITE, Ph.D. TM
Program Chair, BSCpE
Date: Aug 5, 2019

ENGR. VIRNE V. PORTUGUES
Program Chair, BSCE
Date: Aug 5, 2019

Noted by:

ENGR. ROBERT R. BACARRO, MECE, MBA
Dean, CEIT

Date: Aug. 5, 2019

Recommended by:

CARLOS H. DONOSO, EdD
Campus Director

Date: Aug. 5, 2019

Approved by:

EMMYLOU A. BORJA, EdD
VP for Academic Affairs

Date: Aug. 5, 2019

OFFICE OF THE VICE PRESIDENT FOR ACADEMIC AFFAIRS

SSCT SURIGAO CITY
OFFICE OF VP-ACADEMIC AFFAIRS
RELEASED
DATE: 10/23/19
NAME:

MEMORANDUM

REFERENCE NO. : SSCT, OVPAA –10–14, Series 19
DATE : OCTOBER 23, 2019
TO : ALL FACULTY
FROM : THE VICE-PRESIDENT FOR ACADEMIC AFFAIRS
SUBJECT : WORKSHOP ON OBE SYLLABI ENHANCEMENT

You are hereby requested to attend in the aforementioned workshop organize by this office at SSCT Academic Hall. The workshop will be on the following schedule.

College of Teacher Education (CTE) -October 28-29, 2019
College of Arts and Sciences (CAS) - October 30-31, 2019
College of Engineering and Information Technology (CEIT)-November 4-5, 2019
College of Technology (COT) - November 6-7, 2019

The participants are requested to bring laptop, books and references, and hard/soft copies of their syllabi.

Please be guided accordingly.

EMMYLOU A. BORJA, EdD
Vice-President, Academic Affairs

The Office of the Vice-President for Academic Affairs initiated to conduct a Workshop on OBE Syllabi Enhancement last October 28 – November 7, 2019. Dr. Merlyn Estoque was being invited as Resource Speaker on the said workshop to share her expertise in OBE Syllabi. The event was conducted at SSCT Academic Hall and was actively participated by all Faculty across Colleges. This event helps the faculty to enhance their OBE course syllabi using the appropriate action verbs as iLO's and other parts using the standard format. The seminar ended with a presentation and critiquing of outputs by the participating faculty per program.

"For Nation's Greater Heights"
Republic of the Philippines
SURIGAO STATE COLLEGE OF TECHNOLOGY
Narciso Street, Surigao City

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Please be guided accordingly.

EMMYLOU A. BORJA, EdD
Vice-President, Academic Affairs

Received :

CEIT - 10-23-19 2:51
COT - 10-23-19 3:55 PM
CTE - 10/23/19 3PM
CAS - 10/23/19 2:20PM

SURIGAO STATE COLLEGE
OF TECHNOLOGY

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COLLEGE OF ENGINEERING & INFORMATION TECHNOLOGY
1st Semester, AY 2019 - 2020

ATTENDANCE LOGBOOK

Seminar-Workshop for Syllabi Making, SSCT Academic Hall

Session: **Morning**
Date: **November 6, 2019**

FACULTY	SEX		SIGNATURE
	Male	Female	
1. ACIDO, Josephine V.		✓	
2. ANDALUZ, Rosanne E.			
3. BACARRO, Robert R.	✓		
4. BADIOLA, Richard A.	✓		
5. BALDAPAN, Joselito S.			
6. BUCTUAN, Renz M.			
7. CAGAS, Unife O.		✓	
8. CALINAWAN, Aldrich B			
9. CORVERA, Levi A.	✓		
10. DELA CERNA, Monalee A.			
11. DELOSA, Conrado Jr. B.			
12. DUMAICOS, Trashy P.	✓		
13. ESCABAL, Ingrid B.		✓	
13. FERNANDEZ, Jessica Rose E.			
14. FRANCISCO, Virnille C.		✓	
15. GALLERA, Jovie M.		✓	
16. MADELO, Aurea M.			
17. MAG-USARA, Arvin E.			
18. MANGCA, Darwin C.	✓		
19. MONTEJO, Amor C.		✓	
20. MORITE, Analyn S.			
21. NOGUERRA, Crispin P.	✓		
22. PASCUA, Gracechell M.			
23. PORTUGUES, Virne P.			
24. POTENTE, Lufre			
25. REYNA, Alma Christie C.		✓	
26. REYNA, Ritchie A.			
27. RUAYA, Perfecto Jr. R.	✓		
28. SOLLOSO, Marlon C.			
29. TOLEDO, Teresita L.			
30. YLAYA, Vrian Jay V.			
31. QUITALIG, Jocelyn A.		✓	

SURIGAO STATE COLLEGE
OF TECHNOLOGY

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COLLEGE OF ENGINEERING & INFORMATION TECHNOLOGY
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Seminar-Workshop Syllabi Making, SSCT Academic Hall

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Date: **November 6, 2019**

FACULTY	SEX		SIGNATURE
Guest Lecturer:	Male	Female	
1. BIRAO, Eva Mary A.		✓	
2. CABAÑERO, Ralph Aran C.			
3. FIDELES, Jemielou M.			
4. GALILA, Galgen B.			
5. GALILA, Ghandi B.			
6. GEGONA, Archie C.	✓		
7. HAMBRE, Jessa G.			
8. LIZA, Vernon V.		✓	
9. MANUNGAS, John Pearl	✓		
10. NAVARRO, Andy Bong F.			
11. NOGUERRA, Kaelf Dave			
12. ORIT, Erlito M.			
13. PEJAN, Elmario			
14. SALUBRE, Hasmer			
15. Galgo, Liezl C.		✓	

SURIGAO STATE COLLEGE
OF TECHNOLOGY

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	1 August 2019
	1 of 1

COLLEGE OF ENGINEERING & INFORMATION TECHNOLOGY
1st Semester, AY 2019 - 2020

ATTENDANCE LOGBOOK

Seminar-Workshop Syllabi Making, SSCT Academic Hall

Session: **Afternoon**
Date: **November 6, 2019**

FACULTY	SEX		SIGNATURE
Guest Lecturer:	Male	Female	
1. BIRAO, Eva Mary			
2. CABAÑERO, Ralph Aran C.		✓	
3. FIDELES, Jemielou M.	✓		
4. GALILA, Galgen B.	✓		
5. GALILA, Ghandi B.			
6. GEGONA, Archie C.	✓		
7. HAMBRE, Jessa G.			
8. LIZA, Vernon V.		✓	
9. MANUNGAS, John Pearl	✓		
10. NAVARRO, Andy Bong F.			
11. NOGUERRA, Kaelf Dave			
12. ORIT, Erlito M.			
13. PEJAN, Elmario			
14. SALUBRE, Hasmer			
15. GALEO, UEZLE	✓		
		✓	

SURIGAO STATE COLLEGE OF TECHNOLOGY

Revision No.	00
Effective Date	1 August 2019
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COLLEGE OF ENGINEERING & INFORMATION TECHNOLOGY
1st Semester, AY 2019 - 2020

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19. MONTEJO, Amor C.		✓	
20. MORITE, Analyn S.			
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24. POTENTE, Lufre			
25. REYNA, Alma Christie C.		✓	
26. REYNA, Ritchie A.			
27. RUAYA, Perfecto Jr. R.			
28. SOLLOSO, Marlon C.			
29. TOLEDO, Teresita L.			
30. YLAYA, Vrian Jay V.	✓		
31. QUITALIG, Jocelyn A.			