Republic of the Philippines
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College of Engineering Technology

BACHELOR OF ELECTRONICS ENGINEERING TECHNOLOGY

CMO Reference No. 13, S. 2023; CMO Reference No. 4, S. 2018; CMO Reference No. 20, S. 2013;
CMO Reference No. 39, S. 2021; CMO Reference No. 40, S. 2021
ABET-ETAC Criteria for Accrediting Engineering Technology Programs 2023-2024

I. University Vision

A premier national university that develops leaders in the global knowledge economy.

II. University Mission

A university committed to producing leaders by providing a 21st century learning environment through innovations in education, multidisciplinary research, and community and industry partnerships in order to nurture the spirit of nationhood, propel the national economy, and engage the world for sustainable development

III. University Core Values

Patriotism
This value extends from promoting love of country to taking pride in being a Filipino. The University advocates a strong sense of commitment to national ideals through its active promotion of the Philippine culture and heritage, as well as concern for the environment and the nations, all of which lead to the creation of a pool of professionals who are instrumental for nation building.

Integrity
This pertains to the University's steadfast adherence to morally-sound principles and ideals in the pursuit of institutional goals and objectives. It covers the values of accountability, honesty, righteousness, incorruptibility, and decency in the governance and implementation of academic, administrative, financial policies.

Excellence
This represents the drive of the University to pursue greatness. It includes the cultivation of a culture of excellence in the hearts and minds of the stakeholders, and the continuous improvement in the systems by which the University operates on. This value pushes the institution to go beyond the standard levels of performance, and be in a position of leadership that would inspire the people and other institutions to serve the country in the highest degree.

Service
This refers to the genuine desire of the University to respond to the growing needs of the community. It encompasses the selfless performance of the University's mandates, and in duty to constantly meet the challenges of development in the country in the spirit of uplifting the lives of the Filipino people.

Resilience
This refers to the ability to conquer the different challenges, hardships and tests of time. This value encompasses the commitment of the University to support the government in pursuing sustainable development, and foster disaster risk reduction and management by

dedicating its efforts towards strengthening readiness and capacity of the community and its people.

Faith

The University's initiatives and activities are guided by a strong faith in a Supreme Being. These are anchored on high regard and respect for the beliefs and orientation of each member of the academic community for a productive and meaningful co-existence.

IV. Philosophy or Rationale of the Program

The Bachelor of Electronics Engineering Technology program harmonizes theoretical knowledge with practical application. Commencing with foundational courses such as Circuit Analysis, Electronic Devices, and Digital Electronics, students progressively engage with advanced subjects like Power Electronics, Robotics and Control Systems, ensuring a comprehensive grasp of electronic systems and devices.

Aligned with this philosophy are key program objectives, notably the cultivation of Successful Professional Practice. The infusion of ethics and professionalism throughout the curriculum, exemplified in dedicated courses such as Ethics in Engineering, serves to instill a strong sense of integrity and responsibility in students. Simultaneously, the program places a strategic emphasis on Technological Advancement, integrating topics like Microcontroller Systems and Communications. This strategic focus equips students to navigate dynamic technological landscapes, fostering adaptability and continuous learning.

Ultimately, the program's overarching goal is to produce well-rounded professionals capable of not only mastering the laws and standards of electronics but also applying this knowledge ethically. By emphasizing innovation and adaptability, the Bachelor of Electronics Engineering Technology program aims to prepare students for impactful contributions to the field and adept navigation of evolving industry demands.

V. Program Educational Objectives

PEO 1	Title: **Successful Professional Practice**	
	Description: Successfully practice as electronics engineering technologists for the welfare of the society.	
	KPI 1	Graduates are involved in operations planning with contribution towards improving processes.
	KPI 2	Graduates are able to undertake technology activities in a way that contributes to sustainable development
	KPI 3	Graduates are actively involved in designing of new systems and processes and/or providing consultancy and advice to either internal or external customers.
PEO 2	Title: **Ethics and Professionalism**	
	Description: Demonstrate a high degree of ethics and professionalism at all time	
	KPI 1	Graduates have planned for effective project implementation through managing the planning, budgeting and organization of tasks, people, and resources.

	KPI 2	Graduates have managed teams and developed staff to meet changing technical and managerial needs.
	KPI 3	Graduates are developing or have started a company or partnership business.
	KPI 4	Graduates have managed continual quality improvement.
PEO 3	Title: **Technological Advancement**	
	Description: Contribute to the technological advancement for the welfare of the humanity	
	KPI 1	Graduates have actively contributed to the development of new technologies, processes and/or methodologies or improvements in existing ones
	KPI 2	Graduates participated in research and development projects aimed at technological innovations
	KPI 3	Graduates have actively engaged with stakeholders including communities and end-users, to understand and address real-world challenges
	KPI 4	Graduates communicate and collaborate with interdisciplinary teams to ensure the societal impact of their technological contributions.

VI. Career Opportunities

The Bachelor of Electronics Engineering Technology program serves as a gateway to a dynamic realm where theory meets hands-on application. Graduates emerge with a profound understanding of electronic systems, setting the stage for impactful contributions in the ever-evolving field of electronics and engineering. Rooted in a philosophy that balances theoretical rigor with practical proficiency, this program equips individuals with the skills needed to navigate and innovate within diverse sectors. The emphasis on ethics and professionalism ensures that graduates not only possess technical expertise but also carry a strong sense of responsibility and integrity as they embark on their professional journeys.

Potential career paths for graduates include roles as:

1. Electronics Technician/Technologist
2. Automation Specialist
3. Telecommunications Technician/Technologist
4. Instrumentation Technician/Technologist
5. Quality Assurance Specialist

VII. Allied Programs

The Bachelor of Electronics Engineering Technology is a specialized program focusing on the integration and synergy of mechanical, electrical, electronics, and computing systems.

Being such, the following may be considered allied programs of Bachelor of Electronics Engineering Technology:

1. Electrical Engineering
2. Computer Science/Engineering
3. Mechanical Engineering
4. Robotics
5. Automation and Control Engineering
6. Instrumentation and Control Engineering
7. other Engineering Technology Programs

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VIII. Institutional Graduate Attributes

1. **Knowledge Competence** - Demonstrate a mastery of the fundamental knowledge and skills required for functioning effectively as a professional in the discipline, and an ability to integrate and apply them effectively to practice in the workplace.

2. **Creativity and Innovation** - Experiment with new approaches, challenge existing knowledge boundaries and design novel solutions to solve problems.

3. **Critical and Systems -** Identify, define, and deal with complex problems pertinent to the future professional practice or daily life through logical, analytical and critical thinking.

4. **Communication -** Communicate effectively (both orally and in writing) with a wide range of audiences, across a range of professional and personal contexts, in English and Pilipino

5. **Lifelong learning –** Identify own learning needs for professional or personal development; demonstrate an eagerness to take up opportunities for learning new things as well as the ability to learn effectively on their own.

6. **Leadership, teamwork, and Interpersonal Skills** - Function effectively both as a leader and as a member of a team; motivate and lead a team to work towards goal; work collaboratively with other team members; as well as connect and interact socially and effectively with diverse culture.

7. **Global Outlook -** Demonstrate an awareness and understanding of global issues and willingness to work, interact effectively and show sensitivity to cultural diversity.

8. **Social and National Responsibility -** Demonstrate an awareness of their social and national responsibility; engage in activities that contribute to the betterment of the society; and behave ethically and responsibly in social, professional and work environments.

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IX. Student Outcomes

SO 1	**Problem Analysis**	
	Ability to apply their knowledge of mathematics, science, engineering, and technology, along with analytical tools, to solve broadly-defined engineering problems within their discipline and to enhance industrial technology processes creatively and innovatively that is within industry standards	
	KPI 1	Determine the present technology's issues and limitations
	KPI 2	Analyze the situation and come up with a solution using scientific and mathematical principles
	KPI 3	Use logical, mathematical and technical principles in formulating solutions
SO 2	**Design and Development of Solutions**	
	Ability to design and implement systems, components, and processes to address broadly-defined engineering problems within the discipline, while demonstrating proficiency, adaptability, and adherence to global standards in meeting industry-specific requirements	
	KPI 1	Design systems, components or processes that will achieve program objectives
	KPI 2	Formulate solutions through various technology-based outputs that will address the needs of the community and industry
SO 3	**Communication**	
	Ability to demonstrate proficiency in written, oral, and graphical communication in broadly-defined technical and non-technical environments, effectively utilizing relevant technical literature and culturally sensitive language while ensuring clarity and persuasion in conveying information, including the ability to understand and provide clear instructions, maintain high comprehension levels, deliver compelling presentations, compose effective documents, and articulate technological innovation outputs to diverse clientele	
	KPI 1	Convey ideas through written, oral, and graphical communication in well-defined technical and non-technical environments;
	KPI 2	Exhibit oral and visual communication skills suited to the industrial technology profession
	KPI 3	Show proficiency in writing research-based papers, stylistic essays and technical reports
SO 4	**Investigation**	
	Ability to perform standard tests, measurements, and experiments, and subsequently analyze and interpret the results to enhance processes, while also applying contemporary techniques, resources, and cutting-edge engineering technology tools to address current industry requirements and to foster entrepreneurial growth, all while upholding the safety and health standards of business and industry.	
	KPI 1	Examine a series of experimental results
	KPI 2	Conduct experiments to evaluate the interpretation of theories
	KPI 3	Design the solution to mitigate the identified gaps
SO 5	**Leadership and Teamwork**	
	Ability to function effectively both as team members and leaders in technical teams, while also developing and demonstrating leadership and management competencies within team-based environments, making informed decisions, motivating teams, delegating responsibilities, and inspiring positive organizational change through the practice of their profession with integrity and accountability.	
	KPI 1	Establish team rapport, priorities and action plans to meet the goal
	KPI 2	Participate actively in team activities as a member(s) in meetings and help to reinforce concepts
	KPI 3	Show appreciation for the efforts exerted by each member

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SO 6	**Ethics and Professionalism**	
	Ability to adhere to the moral, ethical and professional responsibility of an engineering technologist in balancing the broader public interest while upholding the ethical norms and safety standards within the industrial technology profession.	
	KPI 1	Demonstrate professional and ethical values in the workplace
	KPI 2	Examine the condition that necessitates a decision based on moral, legal and technical aspects
SO 7	**Lifelong Learning**	
	Ability to demonstrate enthusiasm and commitment to lifelong learning, nurturing ongoing personal and professional development, and driving positive transformations within the broadly-defined engineering technology field for entrepreneurial and industrial development.	
	KPI 1	Promote lifelong learning programs in order to progress and grow one's career
SO 8	**Social and National Responsibility**	
	Apply acquired engineering technology knowledge and skills in addressing community problems that contributes to national development.	
	KPI 1	Be updated with the current national and global issues, technologies and problems in the technological and non-technical space concerning one's profession
	KPI 2	Be abreast with the recent trends in the industry

X. Teaching, Learning, and Assessment Pedagogies

- **Lecture.** Although the usefulness of other teaching strategies is being widely examined today, the lecture still remains an important way to communicate information.
- **Case Method.** Providing an opportunity for students to apply what they learn in the classroom to real-life experiences has proven to be an effective way of both disseminating and integrating knowledge. The case method is an instructional strategy that engages students in active discussion about issues and problems inherent in practical application.
- **Discussion.** Other faculty find it helpful to have student's list critical points or emerging issues, or generate a set of questions stemming from the assigned reading(s).
- **Distance Learning.** Distance learning is not a new concept. We have all experienced learning outside of a structured classroom setting through television, correspondence courses, etc. Distance learning or distance education as a teaching pedagogy, however, is an important topic of discussion on college campuses today.
- **Integrating Technology.** Today, educators realize that computer literacy is an important part of a student's education. Integrating technology into a course curriculum when appropriate is proving to be valuable for enhancing and extending the learning experience for faculty and students
- **Cooperative Learning.** Cooperative Learning is a systematic pedagogical strategy that encourages small groups of students to work together for the achievement of a common goal. The term 'Collaborative Learning' is often used as a synonym for cooperative learning when, in fact, it is a separate strategy that encompasses a broader range of group interactions such as developing learning communities, stimulating student/faculty discussions, and encouraging electronic exchanges (Bruffee, 1993). Both approaches stress the importance of faculty and student involvement in the learning process.
- **Active Learning.** Many studies show that learning is enhanced when students become actively involved in the learning process. Instructional strategies that engage students in the learning process stimulate critical thinking and a greater awareness of other perspectives.

- The assessment methods at the end of the topic like assignments, quizzes, midterm and final examinations will be conducted throughout the duration of the course.
- Class test and return demonstration method are after the discussion of the major topics while the other works are distributed throughout the duration of the course.

XI. Integration of New Principles in the Enhanced OBE Framework

Outcome-based education (OBE) is an approach that emphasizes learning outcomes and skills that students should possess after completing a program. The Bachelor of Electronics Engineering Technology is a degree that prepares students to enter the workforce in various fields of engineering technology. To enhance the OBE framework in this program, several new principles have been integrated to align with current trends and needs.

The new principles that have been integrated into the enhanced OBE framework of the program include technology infusion, CDIO approach, SDGs, Gender and Development, Peace studies/education, indigenous studies/education, Internationalization, and Red Spartan Spirit. These principles provide students with practical skills, cultural awareness, social responsibility, and a broad understanding of global issues that are essential for success in today's workforce.

The integration of these principles into the enhanced OBE framework provides students with a comprehensive education that prepares them for their future careers. The program, with its enhanced OBE framework, focuses on providing students with the knowledge and skills they need to succeed in their chosen field, while also contributing to sustainable development and social responsibility.

Technology Infusion

The Bachelor of Electronics Engineering Technology program necessitates continuous infusion of technology to stay relevant in the fast-paced, ever-changing industrial landscape. Rapid technological innovation has transformed traditional engineering practices, and the program must adapt to these changes to remain competitive and address industry demands.

By integrating technology into the curriculum, students gain a comprehensive understanding of the latest advancements in electronics engineering technology. This knowledge enables them to adeptly incorporate cutting-edge technologies like embedded systems, electronic control systems, digital signal processing, and microprocessor applications into their work processes. The integration of software and hardware components further enhances efficiency, precision, and safety in engineering and industrial practices. Therefore, the infusion of technology is imperative to equip students with the knowledge and skills needed to meet the challenges of the modern industrial world.

Integration of Conceive, Design, Implement, Operate Principles (CDIO)

The integration of CDIO principles into the Bachelor of Electronics Engineering Technology program is essential to prepare students to become innovative and competent professionals capable of meeting the challenges of the rapidly evolving industrial landscape. The CDIO framework emphasizes the integration of theory and practice in engineering and technology education, providing students with a hands-on, practical approach to learning. This approach is particularly relevant to this program, and it enables

students to develop a comprehensive understanding of the entire industrial process, from conception to operation, through project-based learning activities and real-world projects. Furthermore, this approach fosters teamwork, communication, and problem-solving skills, which are vital in the modern industrial world.

Integration of Sustainable Development Goals Principles

The Sustainable Development Goals (SDGs) principles, adopted by the United Nations, aim to achieve a better and more sustainable future for all by addressing various global challenges such as poverty, inequality, climate change, and environmental degradation. The SDGs provide a framework for action and serve as a universal call to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity. The relevance of the SDGs principles to the Bachelor of Electronics Engineering Technology program is crucial as it equips students with the knowledge and skills necessary to create innovative and sustainable solutions in various fields, especially in engineering and industrial fields. The program requires the integration of the SDGs into the curriculum to promote responsible production and consumption, sustainable infrastructure, clean energy, and environmentally-friendly practices. Hence, the inclusion of the SDGs in the program prepares students to become responsible and innovative engineering technologists who contribute to achieving a sustainable future.

Integration of Gender and Development

Gender and Development (GAD) is a crucial aspect of contemporary societies as it helps to create equitable opportunities for people of all genders. In the context of the Bachelor of Electronics Engineering Technology, GAD is highly relevant to the program's learning objectives and outcomes, as it can help students gain a deeper understanding of how gender roles and stereotypes affect the industries they are preparing to enter. Specifically, the program requires students to be proficient in engineering and technological knowledge and skills. However, without an understanding of GAD, students may overlook how gender norms affect the way people interact with technology and how this can perpetuate gender inequalities. Therefore, incorporating GAD into the program can help students become more socially aware and responsible professionals who can contribute to a more equitable and sustainable future.

Integration of Peace Studies / Education

Integration of peace studies/education into the Bachelor of Elecronics Engineering Technology equips students with vital knowledge, skills, and attitudes needed for a peaceful and sustainable world. This integration exposes students to diverse conflict perspectives, fosters critical thinking, and enhances communication and problem-solving skills. Those exposed to peace studies/education can apply their expertise to promote workplace peace, engage in constructive dialogue, and contribute to sustainable technology development. Thus, the integration is essential for producing socially responsible, ethical engineering technologists committed to building a peaceful world.

Integration of Indigenous Studies / Education

Integration of Indigenous Studies/Education into the Bachelor of Electronics Engineering Technology provides students with a deep understanding of indigenous history, cultures, and perspectives, fostering collaborative work with indigenous communities and businesses. This

knowledge enhances cultural competence, making students more sensitive to the unique needs of Indigenous peoples. Through critical analysis, students reflect on their professional roles, promoting ethical practices that prioritize sustainability, social justice, and equity. Incorporating this principle into the program will empower students to operate effectively in diverse contexts and contribute to positive social change.

Internationalization

Internationalization is integral to the objectives of the Bachelor of Electronics Engineering Technology. Embracing it exposes students to diverse cultures, languages, and perspectives, enhancing their global competency. This broader outlook aids in understanding global markets and technology, crucial in the rapidly evolving world of engineering technology. Internationalization also opens doors to study abroad, international internships, and collaborations with peers and experts worldwide, offering valuable experiences that enrich students' education and career prospects.

Integration of the Red Spartan Spirit Course / Topics

The Red Spartan Spirit embodies passion, perseverance, and dedication—essential qualities for Bachelor of Electronics Engineering Technology students. Aligned with program goals, it cultivates knowledge, competence, creativity, critical and systems lifelong learning, leadership, teamwork, interpersonal skills, global outlook, and social and national responsibility. This spirit instills determination, fostering mastery of foundational knowledge and skills in Electronics Engineering Technology. Encouraging the challenge of existing boundaries and experimentation with novel approaches, it promotes creativity and innovation. Through critical and systems lifelong learning, students adapt to technological advancements, developing leadership, teamwork, and interpersonal skills for effective global collaboration while honoring social and national responsibilities.

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ACADEMIC PROGRAM			Technology Infusion	Integration of Conceive, Design, Implement, Operate Principles (CDIO)	Integration of Sustainable Development Goals Principles	Integration of Gender and Development	Integration of Indigenous Studies / Education	Integration of Peace Studies / Education	Internationalization	Integration of the Red Spartan Spirit Course
No.	Course Code	Course Title								
NON-TECHNICAL COURSES										
A. Required General Education Courses					SDG 5	1		1		2,6
1	GEd 101	Understanding the Self	1							
2	GEd 102	Mathematics in the Modern World	1				1			
3	GEd 104	The Contemporary World	1		SDG 4				1	
4	GEd 105	Readings in Philippine History	1		SDG 16			1		
5	GEd 106	Purposive Communication	1		Intro to SD	1	1		1	
6	GEd 107	Ethics	1						1	1
7	GEd 108	Art Appreciation	1			1		1		2, 5,6

8	GEd 109	Science, Technology, and Society	1								
B. Mandated Courses											
1	GEd 103	Life and Works of Rizal	1							1	
C. Elective Course											
1	Litr102	ASEAN Literature	1	1		1				3,4	
2	GAD101	Gender and Society									
3	ES101	Environmental Science									
D. PATHFit & NSTP											
1	PATHFit 1	Movement Competency Training	1		SDG 3						
2	PATHFit 2	Exercise-based Fitness Activities	1							1	
3	PATHFit 3	Traditional and Recreational Games	1								
4	PATHFit 4	Team Sports (Basketball and Volleyball)	1								
5	NSTP 111	National Service Training Program 1			SDG 11			1		1,4	
6	NSTP 121	National Service Training Program 2			SDG 11			1		1,4	
TECHNICAL COURSES											
A. Math and Sciences Courses											
1	MathET140	Comprehensive Math (Algebra, Trigonometry, Analytic Geometry)	1								
2	MathET141	Differential Calculus for BET	1								
3	MathET241	Integral Calculus for BET	1								
4	MathET242	Probability and Statistics	1								
5	SciET141	Chemistry	1								
6	SciET142	Physics	1								
B. Manageme											

nt and Tool Courses											
1	CpET140	Computer Programming	1								
2	BET141	Production Drawing	1								
3	BET142	Computer Aided Design	1								
4	BET 143	Occupational Health and Industrial Safety Management	1								
5	BET 241	Materials Selection & Testing	1								
6	BET 341	Quality Control and Assurance	1								
7	BET342	Technopreneurship for BET	1								
8	BET 344	Engineering Technology Ethics	1								
9	BET 345	Industrial Operation & Management Practices	1								
10	BET 346	Engineering Technology Management	1								
C. Professional Courses											
1	ELXET 141	Electronics Laws and Standards	1		SDG 9						
2	ELET 141	Circuit Analysis I	1		SDG 9						
3	ELXET 142	Electronic Devices	1		SDG 9						
4	ELET 143	Circuit Analysis II	1		SDG 9						
5	ELXET 143	Digital Electronics	1		SDG 9						
6	MXET 242	Electro- Pneumatics and Electro-Hydraulics	1		SDG 7						
7	MXET 244	Programmable Logic Control	1		SDG 8						

8	ELXET 144	Instrumentation Measurement and Laboratory	1		SDG 9						
9	MXET342	Control System	1		SDG 9						
10	ELXET 241	Microcontroller System	1		SDG 8						
11	ELXET 242	Analog and Digital Signal Analysis	1		SDG 9						
12	ELXET 341	Communications System I	1		SDG 9						
13	ELXET 342	Power Electronics	1		SDG 9						
14	ELXET 343	Introduction to Robotics and Automation	1		SDG 9						
15	ELXET 344	Advanced Automation Controller Systems	1		SDG 9						
16	ELXET 345	Electrical Machines and Power Systems	1		SDG 7						
17	BET343	Technology Capstone Project 1	1	1							
18	BET347	Technology Capstone Project 2	1	1							
19	BET441	Supervised Industrial Training 1	1	1							
20	BET442	Supervised Industrial Training 2	1	1							

*Legend: **0**-Not Integrated, **1**- Integrated*

For Red Spartan Spirit, core values of the university are mapped to the different courses of the program.

1. ***Patriotism***
2. ***Integrity***
3. ***Excellence***
4. ***Service***
5. ***Resilience***
6. ***Faith***

XII. Proposed Curriculum Structure

BACHELOR OF ELECTRONICS ENGINEERING TECHNOLOGY

FIRST YEAR							
FIRST SEMESTER							
Course Code	**Course Title**	**Lec**	**Lab**	**Credit Units**	**Pre-requisite(s)**	**Co-requisite(s)**	**Category**
ELXET 141	Electronics Laws and Standards	2	0	2			TC-C
ELET 141	Circuit Analysis I	2	3	3			TC-C
ELXET 142	Electronic Devices	2	3	3			TC-C
GEd 101	Understanding the Self	3	0	3			NTC-A
GEd 102	Mathematics in the Modern World	3	0	3			NTC-A
SciET141	Chemistry	3	3	4			TC-A
BET141	Production Drawing	1	6	3			TC-B
MathET140	Comprehensive Math (Algebra, Trigonometry, Analytic Geometry)	3	0	0			TC-A
PATHFit 1	Movement Competency Training	2	0	2			NTC-D
NSTP 111	National Service Training Program 1	3	0	3			NTC-D
	Total	**24**	**15**	**26**			
FIRST YEAR							
SECOND SEMESTER							
Course Code	**Course Title**	**Lec**	**Lab**	**Credit Units**	**Pre-requisite(s)**	**Co-requisite(s)**	**Category**
ELET 143	Circuit Analysis II	2	3	3	ELET 141		TC-C
ELXET 143	Digital Electronics	2	3	3	ELXET 142		TC-C
ELXET 144	Instrumentation Measurement and Laboratory	2	3	3	ELXET 142		TC-C
Ged 103	Life and Works of Rizal	3	0	3			NTC-B
SciET142	Physics	3	3	4	MathET140		TC-A
BET142	Computer Aided Design	1	3	2	BET141		TC-B
PATHFit 2	Exercise-based Fitness Activities	2	0	2	PATHFit 1		NTC-D
NSTP 121	National Service Training Program 2	3	0	3	NSTP 111		NTC-D
	Total	**18**	**15**	**23**			
FIRST YEAR							
MIDTERM SEMESTER							
Course Code	**Course Title**	**Lec**	**Lab**	**Credit Units**	**Pre-requisite(s)**	**Co-requisite(s)**	**Category**
GEd 104	The Contemporary World	3	0	3			NTC-A
MathET141	Differential Calculus for BET	3	0	3	MathET140		TC-A
BET 143	Occupational Health and Industrial Safety Management	3	0	3			TC-B
	Total	**9**	**0**	**9**			

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SECOND YEAR							
FIRST SEMESTER							
Course Code	**Course Title**	**Lec**	**Lab**	**Credit Units**	**Pre-requisite(s)**	**Co-requisite(s)**	**Category**
MXET 242	Electro-Pneumatics and Electro-Hydraulics	2	3	3	ELXET 143		TC-C
ELXET 241	Microcontroller System	2	3	3	ELXET 143		TC-C
MXET342	Control System	2	3	3	ELXET 144		TC-C
Litr102	ASEAN Literature	3	0	3			NTC-C
GEd 105	Readings in Philippine History	3	0	3			NTC-A
MathET241	Integral Calculus for BET	3	0	3	MathET141		TC-A
CpET140	Computer Programming	2	3	3			TC-B
PATHFit 3	Traditional and Recreational Games	2	0	2	PATHFit 1 & 2		NTC-D
	Total	**19**	**12**	**23**			
SECOND YEAR							
SECOND SEMESTER							
Course Code	**Course Title**	**Lec**	**Lab**	**Credit Units**	**Pre-requisite(s)**	**Co-requisite(s)**	**Category**
ELXET 242	Analog and Digital Signal Analysis	2	3	3	MathET241		TC-C
MXET 244	Programmable Logic Control	2	3	3	MEXT 342, ELXET 241		TC-C
GAD101	Gender and Society	3	0	3			NTC-C
BET 241	Materials Selection & Testing	3	0	3			TC-B
GEd 106	Purposive Communication	3	0	3			NTC-A
MathET242	Probability and Statistics	3	0	3	MathET241		TC-A
PATHFit 4	Team Sports (Basketball and Volleyball)	2	0	2	PATHFit 1 & 2		NTC-D
	Total	**18**	**6**	**20**			

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THIRD YEAR							
FIRST SEMESTER							
Course Code	**Course Title**	**Lec**	**Lab**	**Credit Units**	**Pre-requisite(s)**	**Co-requisite(s)**	**Category**
ELXET 341	Communications System I	2	3	3	ELXET 242		TC-C
ELXET 342	Power Electronics	2	3	3	MXET 241		TC-C
ELXET 343	Introduction to Robotics and Automation	2	3	3	ELXET 241		TC-C
GEd 107	Ethics	3	0	3			NTC-A
GEd 108	Art Appreciation	3	0	3			NTC-A
BET 341	Quality Control and Assurance	3	0	3			TC-B
BET 342	Technopreneurship for BET	3	0	3			TC-B
BET 343	Technology Capstone Project 1	2	3	3	MXET245	MXET342	TC-C
	Total	**20**	**12**	**24**			
THIRD YEAR							
SECOND SEMESTER							
Course Code	**Course Title**	**Lec**	**Lab**	**Credit Units**	**Pre-requisite(s)**	**Co-requisite(s)**	**Category**
ELXET 344	Advanced Automation Controller Systems	2	3	3	ELXET 343		TC-C
ELXET 345	Electrical Machines and Power Systems	2	3	3	ELXET 342		TC-C
GEd 109	Science, Technology and Society	3	0	3			NTC-A
ES 101	Environmental Science	3	0	3			NTC-C
BET 344	Engineering Technology Ethics	3	0	3			TC-B
BET 345	Industrial Operation & Management Practices	3	0	3			TC-B
BET 346	Engineering Technology Management	3	0	3			TC-B
BET 347	Technology Capstone Project 2	2	3	3	BET343		TC-C
	Total	**21**	**9**	**24**			

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FOURTH YEAR							
FIRST SEMESTER							
Course Code	**Course Title**	**Lec**	**Lab**	**Credit Units**	**Pre-requisite(s)**	**Co-requisite(s)**	**Category**
BET 441	Supervised Industrial Training 1	0	540	6	BET347		TC-C
	Total	**0**	**540**	**6**			
FOURTH YEAR							
SECOND SEMESTER							
Course Code	**Course Title**	**Lec**	**Lab**	**Credit Units**	**Pre-requisite(s)**	**Co-requisite(s)**	**Category**
BET 442	Supervised Industrial Training 2	0	540	6	BET 441		TC-C
	Total	**0**	**540**	**6**			
	Grand Total	**129**	**1149**	**161**			

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XIII. Comparison of Proposed Curriculum Structure with CMO of the Program

Courses	CMO No.13 S.2023 (BIndTech-ELXT)	*Proposed* BELXET
A. Required General Education	24	24
B. Mandated Courses	3	3
C. Elective Courses	9	9
D. PATHFit & NSTP	14	14
Sub-Total	**50**	**50**
A. Math and Sciences Courses	11	17
B. Management and Tool Courses	29	29
C. Professional Courses	64	65
Sub-Total	**104**	**111**
GRAND TOTAL	**154**	**161**

XIV. Curriculum Mapping

Course Code	Course Title	Credit Units	SO1	SO2	SO3	SO4	SO5	SO6	SO7	SO8
First Year – First Semester										
ELXET 141	Electronics Laws and Standards	2		I				I		
ELET 141	Circuit Analysis I	3	I	I						
ELXET 142	Electronic Devices	3	I/R	I/R				I/R		
GEd 101	Understanding the Self	3						I	I	
GEd 102	Mathematics in the Modern World	3	I							
SciET141	Chemistry	4	I/R			I/R				
BET141	Production Drawing	3							I	
MathET140	Comprehensive Math (Algebra, Trigonometry, Analytic Geometry)	0	I							
PATHFit 1	Movement Competency Training	2	I							
NSTP 111	National Service Training Program 1	3							I	
First Year – Second Semester										
ELET 143	Circuit Analysis II	3	I/R	I/R	I/R					
ELXET 143	Digital Electronics	3		I/R	I/R					
ELXET 144	Instrumentation Measurement and Laboratory	3	I/R	I/R						
GEd 103	Life and Works of Rizal	3			I					I
SciET142	Physics	4							I/R	I/R
BET142	Computer Aided Design	2	I/R			I/R				
PATHFit 2	Exercise-based Fitness Activities	2	I/R	I/R						
NSTP 121	National Service Training Program 2	3							I/R	
First Year – Midterm Semester										
GEd 104	The Contemporary World	3			I/R				I/R	I/R
MathET141	Differential Calculus for BET	3	I/R							
BET143	Occupational Health and Industrial Safety Management	3						I/R		I/R

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Second Year – First Semester										
MXET 242	Electro-Peumatics and Electro-Hydraulics	3	R	R						
ELXET 241	Microcontroller System	3	R	R						
MXET342	Control System	3	R	R			R			
Litr102	ASEAN Literature	3							I	
GEd 105	Readings in Philippine History	3			I				I	I
MathET241	Integral Calculus for BET	3	R							
CpET140	Computer Programming	3	I/R	I/R						
PATHFit 3	Traditional and Recreational Games	2							R	
Second Year – Second Semester										
ELXET 242	Analog and Digital Signal Analysis	3	R	R						
MXET 244	Programmable Logic Control	3	R	R		R				
GAD101	Gender and Society	3							I	I
BET241	Materials Selection & Testing	3	I/R	I/R		I/R				
GEd 106	Purposive Communication	3			R			R		
MathET242	Probability and Statistics	3	R							
PATHFit 4	Team Sports (Basketball and Volleyball)	2					R		R	
Third Year – First Semester										
ELXET 341	Communications System	3	D	D						
ELXET 342	Power Electronics	3	D	D		D				
ELXET 343	Introduction to Robotics and Automation	3	D	D			D			
GEd 107	Ethics	3						I		
GEd 108	Art Appreciation	3					I		I	
BET341	Quality Control and Assurance	3	R			R				
BET342	Technopreneurship for BET	3	D	D						D
BET343	Technology Capstone Project 1	3	D	D					D	
Third Year – Second Semester										
ELXET 344	Advanced Automation Controller Systems	3	D	D					D	
ELXET 345	Electrical Machines and Power Systems	3	D	D						
GEd 109	Science, Technology and Society	3						I/R	I/R	I/R
ES101	Environmental Science	3	R							R
BET 344	Engineering Technology Ethics	3						R	R	R
BET 345	Industrial Operation & Management Practices	3				D		D		D
BET 346	Engineering Technology Management	3			R		R			
BET 347	Technology Capstone Project 2	3	D	D					D	
Fourth Year – First Semester										
BET441	Supervised Industrial Training 1	6					D	D	D	D
Fourth Year – Second Semester										
BET441	Supervised Industrial Training 2	6					D	D	D	D

Legend: **I** – *Introduced,* **R** – *Reinforced,* **D** - *Demonstrated*

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XV. Course Description

First Year – First Semester Courses

ELXET 141 Electronics Laws and Standards (2 units)
This course is designed to prepare electronic technician/technologist students for professional practice and standards. Topic includes the knowledge and practice of electronic technicians/technologists stipulated in the RA 9292 and other laws governing the profession, the Philippine Electronics Code, Radio Laws, Basic contracts and Ethics in relation to the electronic practice.

ELET 141 - Circuit Analysis 1 (3 units)
This course uses theory, laboratory investigation, and circuit simulation software to introduce basic electrical and circuit analysis principles. Emphasis is placed on direct current (DC) circuits containing voltage and current sources and resistor networks in series, parallel, and series-parallel configurations. This course also introduces the concepts of electric and magnetic fields of capacitors and inductors and their transient responses in DC circuits. A section on basic alternating current (AC) resistive circuits with sinusoidal sources is included.

ELXET 142 - Electronics Devices (3 units)
This course introduces some of the basic electronic devices like diodes and different types of transistors. It also aims to introduce students the analysis and design techniques of circuits involving these discrete devices as well as the integrated circuits.

GEd 101 - Understanding the Self (3 units)
The course deals with the nature of identity, as well as the factors and forces that affect the development and maintenance of personal identity. The directive to Know Oneself has inspired countless and varied ways to comply. Among the questions that everyone has had to grapple with at one or other is “Who am I?” At no other period is this question asked more urgently than in adolescence – traditionally believed to be a time of vulnerability and great possibilities. Issued of self and identity are among the most critical for the young. This course is intended to facilitate the exploration of the issues and concerns regarding self and identity to arrive at a better understanding of one’s self. It strives to meet this goal by stressing the integration of the persona; with the academic – contextualizing matters discussed in the classroom and in the everyday experiences of students – making for better learning, generating a new appreciation for the learning process, and developing a more critical and reflective attitudes while enabling them to manage and improve themselves to attain a better quality of life**.**

SciET141 - Chemistry 1 (4 units)
This course is tailored to provide a comprehensive understanding of fundamental chemical principles and their practical applications in engineering contexts. The course covers key topics essential for engineering technology, including atomic structure, chemical bonding, stoichiometry, thermodynamics, and kinetics. Emphasis will be placed on the practical aspects of chemistry relevant to engineering, such as material properties, corrosion prevention, and environmental impact. Through a combination of theoretical lectures and hands-on laboratory sessions, students will gain proficiency in chemical analysis techniques and learn to apply chemical principles to solve engineering problems. The course aims to equip engineering technology students with a solid foundation in chemistry, fostering an appreciation for its role in various engineering disciplines and preparing them for future challenges in their careers.

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BET141- Production Drawing (3 units)

This course focuses on the fundamentals of technical drawing. Specific skills introduced in this course may include sketching, lettering, manipulation of drawing tools and instruments, geometric construction, dimensioning, and orthographic drawing. The application of the general principles and practices of sketching, lettering, instrumental drawing, geometrical construction and orthographic drawing are exploratory activities to prepare and challenge the class for the succeeding topics of this course. It provides students with knowledge and challenges in the construction of different working drawings that would help improve their skills in drawing and later use in the construction and manufacturing industries.

MathET140 - Comprehensive Math (Algebra, Trigonometry, Analytic Geometry) (0 unit)

This course is designed to provide engineering technology students with a robust foundation in algebra, trigonometry, and analytic geometry. Beginning with fundamental algebraic principles such as linear and quadratic equations, inequalities, and systems of equations, the course progresses to cover essential trigonometric concepts and their applications. Analytic geometry is introduced to study points, lines, and curves in a coordinate system. Emphasis is placed on practical applications of these mathematical concepts in engineering scenarios, including mechanics, circuit analysis, and geometric modeling. The goal is to enable students to develop a strong mathematical skill set that is essential for success in their engineering technology careers. This course serves as comprehensive preparation for advanced mathematical studies and their practical application in diverse engineering disciplines.

GEd 102 - Mathematics in the Modern World (3 units)

This course deals with the nature of mathematics, appreciation of its practical, intellectual, and aesthetic dimensions, and application of mathematical tools in daily life. The course begins with an introduction to the nature of mathematics as an exploration of patterns (in nature and in environment) and as an application of inductive and deductive reasoning. By exploring these topics, students are encouraged to go beyond the typical understanding of mathematics as merely a set of formulas but as a source of aesthetics in patterns of nature, for example, and a rich language in itself (and of science) governed by logic and reasoning.

NSTP 111 - National Service Training Program 1 (3 units)

This course is one (1) of the (3) components under National Service Training Program Act of 2001 (RA.A. No. 9163) designed to encourage, develop and train the students to contribute to the general welfare and betterment of life for the members of the community or the enhancement of its facilities, especially those devoted to improving health, education, environment, entrepreneurship, safety, recreation, and moral of the citizenry and other social welfare services.

PATHFit 1 - Movement Competency Training (2 units)

This course reintroduces the fundamental movement patterns that consist of non-locomotor and locomotor skills, which are integrated with core training to meet the demands of functional fitness and physical activity performance. Emphasis will be on exercise regression and progression for the enhancement of fitness and the adaptation of movement competencies to independent physical activity pursuits. In conjunction with fitness and wellness concepts, exercise and healthy eating principles, periodic evaluation will be conducted of one's level of fitness and physical activity, as well as eating patterns to monitor one's progress and achievement of personal fitness and dietary goals.

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First Year – Second Semester Courses

ELET 143 - Circuit Analysis II (3 units)
This course deals with the fundamentals of alternating current (AC) circuits including theories, analyses, and design of AC circuits and their applications. This course should be useful in building the knowledge foundation for several future courses on electrical and electronic engineering.

ELXET 143 - Digital Electronics (3 units)
The unit is directed at building on the fundamentals of electrical circuits acquired in the first year of the course to provide technical competence in digital electronics and introduce embedded system development. The unit introduces students to the properties and characteristics of digital electronics and extends these to the design and implementation of digital circuits and microcontroller programming. Students will gain an understanding of basic digital systems and an understanding of how such systems can form part of larger technical systems. Fundamental skills will be gained in the analysis and implementation of digital electronic circuits and systems. Topics covered include: Combinational logic. Sequential logic. Microprocessor fundamentals. The unit prepares students to undertake future studies in advanced Electronic/Communications Engineering.

ELXET 144 Instrumentation Measurement and Laboratory (3 units)
This course delves into the realm of industrial instrumentation, focusing on analog signals and signal models, passive and active circuits for signal conditioning, current loops, transmission lines, line termination, modulation, and scaling and calibration. Students will explore basic measurement principles grounded in resistance, capacitance, light, and magnetism, among other factors, while also delving into instrumentation for selected physical process variables. The course extends its scope to the use of cameras as sensors and explores selected control elements.

Ged 103 - Life and Works of Rizal (3 units)
As mandated by Republic Act 1425, this course covers the life and works of the country's national hero, José Rizal. Among the topics covered are Rizal's biography and his writings, particularly the novels Noli me tangere and El filibusterismo, some of his essays, and various correspondences.

SciET142 - Physics (4 units)
This course is designed to provide students with a foundational understanding of key physical principles applicable to engineering disciplines. Covering classical mechanics, thermodynamics, electromagnetism, and optics, the course emphasizes the practical application of physics concepts in engineering technology. Students will explore the laws governing motion, energy, and forces, as well as delve into topics such as heat transfer, electrical circuits, and wave phenomena. Through a combination of theoretical lectures, hands-on experiments, and problem-solving exercises, students will develop the analytical and critical thinking skills necessary to tackle real-world engineering challenges. The course aims to instill a deep appreciation for the role of physics in engineering, preparing students to apply these principles effectively in their future careers.

BET142 -Computer Aided Design (2 units)
This course is intended to develop the students' knowledge about basic computer aided design. The course work is designed to introduce new user to the software used for drafting. Introduction to drafting will also present. At the completion of this course the student should be able to print out a simple construction drawing which conforms to industry accepted drafting standards using

the AutoCAD program. The course helps students to develop their skills in the field of technology and to be more competitive locally and abroad

NSTP 121 - National Service Training Program 2 (3 units)
The National Service Training Program 2 (NSTP 102). Complements knowledge learned from NSTP 101. It is the application and implementation of NSTP Law, which focuses on participation to community development. While NSTP 101 provides the backdraft and theoretical framework of the program, NSTP 102 is the continuation and validation phase. It is design to equip and empower students with the fundamentals of project identification, planning and implementation in pursuit of contributing to the upliftment of the general welfare and the quality of life of the people in the community through enhancement, in particular, of the school and community facilities. Its advocacy is related to the protection and preservation of environment, as well as improvement of lives, health and safety of the populace through the promotion of risk reduction, peace-making process, safety, recreation and morals of the citizenry.

PATHFit 2 - Exercise-based Fitness Activities (2 units)
This course builds on the foundation of motor skills achieved through core training. It will provide experiences in a variety of exercise programs for the purpose of maintaining and enhancing cardiorespiratory and musculoskeletal fitness (i.e., core stability, muscle strength, endurance and power). It includes speed and agility training with a focus on body coordination and balance. In conjunction with fitness and wellness concepts, exercise and healthy eating principles, learners will be able to enhance their fitness through goal setting and application of the exercise principles (i.e., frequency, intensity, time, type, progression, and volume); adapt their movement competencies to independent physical activity (PA) pursuits and periodically evaluate their PA and eating patterns to monitor their progress and achievement of personal fitness and dietary goals

First Year – Midterm Semester Courses

BET 143 Occupational Health and Industrial Safety Management (3 units)
This course provides engineering technology students with a comprehensive understanding of occupational health and industrial safety management within various engineering and industrial settings, with a specific emphasis on the application of engineering standards and codes. The curriculum covers the identification, assessment, and mitigation of workplace hazards to ensure the well-being of employees and the sustainable operation of industrial facilities, aligned with established engineering standards.

GEd 104 - The Contemporary World (3 units)
This course introduces the students to the contemporary world by examining the multifaceted phenomenon of globalization. Using various disciplines of the social sciences, it examines the economic, social, political, technological and other transformations that have created an increasing awareness of interconnectedness of peoples and places around the globe. To this end, the curse provides an overview of the various debates in global governance, development and sustainability. Beyond exposing the student to the world outside the Philippines, it seeks to inculcate a sense of global citizenship and global ethical responsibility.

MathET141 Differential Calculus for BET(3 units)
This Differential Calculus course for Engineering Technology explores fundamental calculus concepts essential for solving engineering problems. Topics cover functions, derivatives, rules of differentiation, and their applications in engineering scenarios. The course also includes an introduction to multivariable calculus, integration, and basic differential equations. The goal is to

equip students with practical problem-solving skills, laying a foundation for success in their engineering careers and preparing them for advanced calculus studies.

Second Year – First Semester Courses

MXET 242 Electro-Peumatics and Electro-Hydraulics (3 units)
This course covers the principles of electro-pneumatics and electro-hydraulics, which are the integration of electrical, pneumatic, and hydraulic systems. Students will learn how to design and implement electro-pneumatic and electro-hydraulic circuits for a variety of applications. They will also gain hands-on experience in the laboratory.

ELXET 241 Microcontroller System (3 units)
This course serves as an introduction to the fundamental principles governing the operation of microprocessors and microcontrollers. Participants will explore key components such as the Central Processing Unit (CPU), memory, buses, and Input/Output (I/O) interfaces. Topics encompass microcomputer-based system design, providing insights into the intricacies of Windows programming and interfacing.

MXET342 Control System (3 units)
Design and analysis of feedback control systems. Course includes introduction to feedback control systems, open loop and closed loop control, Laplace transforms, control system models, static and dynamic response, stability and performance of control systems, root locus technique, frequency response analysis (Bode plot) and design of controller for feedback control systems.

Litr 102 - ASEAN Literature (3 units)
This course introduces students to fundamental prose and poetry from across Asia. These literary works shape awareness and viewpoints among people in ASEAN. It orients the learners on the diverse culture the members' states have which nurture and build their identities as states and identity as a region as the learners find commonality in the diversity. More so, this course opens awareness of being part of a region to embrace the ASEAN identity through literature.

GEd 105 - Readings in Philippine History (3 units)
This course analyzes Philippines history from multiple perspectives through the lens of selected primary sources. Students are expected to do content and context analysis such as author's background and main arguments, compare different point of view, identify biases and examine the evidences presented in the document. The discussion will tackle traditional topics in history and other interdisciplinary themes that will deepen and broaden the students understanding of Philippine political, economic, cultural, social, scientific religious history. The end goal is to develop the historical and critical consciousness of the students so that they will become versatile, articulate, broadminded, morally upright and responsible citizens.

MathET241 - Integral Calculus for BET (3 units)
This course in Integral Calculus for Engineering Technology is designed to expand on the mathematical foundations established in differential calculus, providing students with a deeper understanding of integral concepts and their applications in engineering contexts. Students will explore topics such as definite and indefinite integrals, the fundamental theorem of calculus, techniques of integration, and applications of integration in engineering, including areas under curves, volumes of solids of revolution, and work problems. The course aims to equip engineering technology students with the analytical tools necessary for solving complex engineering problems and making informed decisions in their future careers. Practical applications and real-world problem-solving will be emphasized throughout the course, ensuring students can apply integral calculus effectively in engineering scenarios.

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CpET140 - Computer Programming I (3 units)
C++ Programming is a course in the Bachelor of Computer Engineering Technology program, dedicated to introducing students to the powerful and versatile programming language, C++. This course covers a wide array of critical topics, including C++ syntax, data structures, object-oriented programming, and application development. The intended learning outcomes encompass the ability to comprehend C++ programming concepts, write and debug C++ code, design and implement C++ applications, and solve real-world problems using C++. By the end of this course, students will be well-prepared to leverage C++ for a variety of applications, making them proficient in roles related to software development, system programming, and algorithm design.

C++ Programming not only imparts technical skills but also cultivates problem-solving, critical thinking, and adaptability, vital for students seeking careers in the dynamic field of computer engineering technology. This course plays a pivotal role in preparing students to become adept programmers and problem solvers in today's technology-driven world, where C++ remains a fundamental and widely used language.

PATHFit 3 - Traditional and Recreational Games (2 units)
(Name of activity) is a (nature of the activity/game objective). It involves the fundamental techniques that include _____. Through skills training, exercise drills, game play and independent or self-directed PAs, fitness levels will be enhanced. In conjunction with this, fitness levels, PA participation and dietary/eating patterns are evaluated to monitor one's progress and achievement of personal fitness and dietary goals.

Second Year – Second Semester Courses

ELXET 242 Analog and Digital Signal Analysis (3 units)
This course offers a comprehensive exploration of the fundamental principles underlying Analog and Digital Signal Analysis. Students will delve into the basic concepts of analog signal generation and shaping, emphasizing the theoretical foundations and practical applications. The curriculum includes a detailed study of data converters, discrete time transforms, and digital filter design.

MXET 244 Programmable Logic Control (3 units)
This course introduces the principles of programmable logic controllers (PLCs), which are used to control industrial automation systems. Students will learn how to program PLCs in ladder logic and function block diagram. They will also gain hands-on experience in the laboratory.

GAD101 - Gender and Society (3 units)
This three-unit course focuses into the concepts, principles, and approaches related to understanding gender as a social construction. It explores the multifaceted role of gender across various aspects of societal life. Topics include gender inequality, gender mainstreaming, and their impact on our country's social fabric. By examining these critical issues, students gain insights into fostering an effective gender-responsive society.

BET 241 - Materials Selection & Testing (3 units)
BET 241 is a comprehensive course that delves into the principles and practices of materials selection and testing within the field of engineering technology. Students will explore the critical processes involved in choosing materials for engineering applications and gain hands-on experience in testing and evaluating the mechanical properties of materials. The course emphasizes

the integration of theoretical knowledge with practical skills to equip students with the expertise needed for informed materials decision-making.

GEd 106 - Purposive Communication (3 units)
Purposive Communication develops students' communicative competence and enhances their cultural and intercultural awareness through multimodal tasks. These provide them opportunities for communicating effectively and appropriately to a multicultural audience in a local or global context, in a physical or virtual environment. It equips students with tools for critical evaluation of a variety of texts and focuses on the power of language and the impact of images to emphasize the importance of conveying messages responsibly. The knowledge, skills, and insights that students gain from this course may be used in their other academic endeavors, their chosen disciplines, and their future careers as they compose and produce relevant oral, written, audio-visual and/or web-based output for various purposes.

MathET242 - Probability and Statistics (3 units)
This course is designed to provide engineering technology students with essential tools for effective decision-making and problem-solving in engineering applications. Covering probability theory, descriptive statistics, inferential statistics, and regression analysis, the course emphasizes practical applications in areas such as quality control, experimental design, and reliability analysis. Students will learn to analyze and interpret data, make informed decisions based on statistical insights, and communicate findings effectively. Through a variety of instructional methods, this course prepares engineering technology students to apply probability and statistics in real-world engineering scenarios, laying the groundwork for more advanced studies in the field.

PATHFit 4 - Traditional and Recreational Games (2 units)
(Name of activity) is a (nature of the activity/game objective). It involves the fundamental techniques that include _____. Through skills training, exercise drills, game play and independent or self-directed PAs, fitness levels will be enhanced. In conjunction with this, fitness levels, PA participation and dietary/eating patterns are evaluated to monitor one's progress and achievement of personal fitness and dietary goals.

Third Year – First Semester Courses

ELXET 341 Communications System (3 units)
This course introduces the fundamentals of electronic communication systems. Topics include the frequency spectrum, electrical noise, modulation techniques, characteristics of transmitters and receivers, and digital communications. Upon completion, students should be able to interpret analog and digital communication circuit diagrams, analyze transmitter and receiver circuits, and use appropriate communication test equipment.

ELXET 342 Power Electronics (3 units)
The course focuses on presenting the fundamental concepts on conversion, control and monitoring of electric energy using power semiconductor devices. Methods for analyzing power electronic converters suitable for AC/DC, DC/DC and DC/AC electrical energy conversions are presented. Additionally, principles for designing power electronic converters, including their power semiconductors and passive elements are established. Computer-aided analysis and simulations of the electrical and thermal performance of power electronic converters is also among the course objectives. The application of power electronic converters in the fields of sustainable energy technologies such as electrified transportation, wind energy, solar power, and electrical energy storage are presented. Furthermore, application of power electronics for transmission, distribution and control in the future electric power grid is described.

ELXET 343 Introduction to Robotics and Automation (3 units)
This course is an overview of robotic and automated systems technology. The student will be introduced to basic manufacturing techniques, robot terminology, different types of automation, safety, basic robotic programming, interfacing robotic communications, automated work cells, and robotic applications. Robot operations and programming fundamentals will be applied by the students

GEd 107 - Ethics (3 units)
Ethics deals with principles of ethical behavior in modern society at the new level of the person, society, and in interaction with the environment and other shared resources (CMO 20 s 2013).
Morality pertains to the standards of right and wrong that an individual originally picks up from the community. The course discusses the context and principles of ethical behavior in modern society at the level of individual, society, and in interaction with the environment and other shared resources. The course also teaches students to make moral decisions by using dominant moral frameworks and by applying a seven-step moral reasoning model to analyze and solve moral dilemmas.

GEd 108 - Art Appreciation (3 units)
The course aims to provide students the opportunity to observe, participate in, or otherwise experience works of art in order to appreciate their role and purpose in life. Students will be exposed to various works of art, ranging from the classical art forms to modern art installations, performance art, indie films, enhanced e-books and multimedia aesthetics. These works of art will be examined from an aesthetic point of view and also as reflections or critiques of the societies that produced them. The course will thus build upon and hone the skills of understanding, critical appreciation and expression of one's views. The course Art Appreciation (under the new GE Curriculum) is aimed at further strengthening the youth's awareness and deep appreciation for the arts. The course shall serve as a continuation of the Subject Contemporary Arts which was already taken in Senior High School. Apart from focusing on Philippine Arts, this course shall further try to situate the local arts in the global perspective and compare its status to standard of arts in the global arena.

BET 341 - Quality Control and Assurance (3 units)
This course is a comprehensive course designed for Engineering Technology students, focusing on the principles and practices of Quality Control and Assurance (QA/QC) within various engineering disciplines. This course equips students with the knowledge and skills necessary to ensure and enhance the quality of products and processes in engineering applications. Emphasis is placed on understanding quality standards, implementing control measures, and establishing assurance protocols to meet industry and regulatory requirements.

BET 342 - Technopreneurship for BET (3 units)
Creating a new business is a challenging and complex task most especially to the industrial technology graduates. The road to entrepreneurial success is long, winding and strewn with pitfalls, obstacles and blind turns. The risks of starting a new business are high, as illustrated by the high failure rates for new ventures. However, as is always the case, the rewards are commensurate with the risk: in addition to the psychic rewards of starting a business. Future technologists should be guided through understanding the process, challenges, risks and rewards of starting up a new business.

BET 343 - Technology Capstone Project 1 (3 units)
This course is designed to provide a sound foundation in research and development methodologies, emphasizing their significance in both industrial settings and academia. As higher education institutions adapt to the dynamic changes of the times, this course addresses the evolving needs of

business and industry. The university is committed to cultivating a learning environment where technologists are not only skilled practitioners but also adept researchers.

This course empowers students with the knowledge and skills essential for conducting impactful research in the realm of technology. By incorporating probability and statistics, students gain a robust foundation for making data-driven decisions and enhancing the overall quality and reliability of their research. Through the Technology Capstone Project, students apply their learning to address real-world challenges, bridging the gap between academia and industry needs.

Third Year – Second Semester Courses

ELXET 344 - Advanced Automation Controller Systems (3 units)
This course delves into the dynamic realm of automation, covering the development of automation and PLC technologies, the intricate interplay of sensors and actuators in manufacturing, and the optimization of assembly processes through robotics and Design for Assembly (DFA) principles. Students will gain hands-on experience in feeder technology, material handling, and explore solutions to real-world challenges in automatic assembly. This course is tailored for professionals and students aspiring to be at the forefront of industrial automation, providing a comprehensive skill set to navigate and innovate within the rapidly evolving landscape of automated control systems. Join us to unlock the potential of advanced automation and shape the future of industry.

ELXET 345 - Electrical Machines and Power Systems (3 units)
This course provides students with a good knowledge and understanding of: the steady state performance, the transient behaviour and control of synchronous machines; power system protection equipment; principles of overcurrent protection of power systems and machines; operation and protection of distributed generators. A number of relevant technical and engineering aspects of the analysis of steady state and transient performance of electrical machines and power supply systems will be considered in the context of operation, protection and control of power supply systems with distributed generation, including their application during the system design and operational stages.

GEd 109 - Science, Technology and Society (3 units)
Science and technology are amongst the most powerful forces operating in the contemporary society. Yet, citizens of contemporary societies have little or no opportunity to learn how to question the power embedded in techno-scientific systems. A formal course is needed for the citizens to do such action. This course presents the analysis from historic and futuristic perspectives of the nature and role of science and technology in society and of the socio-cultural and politico-economic factors affecting the development of science and technology. This course will also introduce to the students the multiple ways in which science and technology, individuals and institutions mutually shape one another to the benefit and sometimes detriment of society. All of the topics in this course are geared toward the appreciation of the key role of science and technology in the national development and the important policy issues in the scientific and technological development of the Philippines.

ES 101 - Environmental Science (3 units)
Through the integration of natural science, politics, culture, and economics with scientific principles, environmental science seeks to provide a thorough understanding of the subject. The understanding of the complex interactions that exist between people and their surroundings is a fundamental component of this course. The emphasis on environmental issues, their root causes, related hazards, and mitigation strategies is consistent with the engineering method of risk

assessment and management. Furthermore, the investigation of substitute solutions is consistent with the engineering dedication to novelty, motivating learners to contemplate sustainable technologies as feasible substitutes.

BET 344 - Engineering Technology Ethics (3 units)
This course provides engineering technology students with a comprehensive understanding of ethical principles, professional responsibilities, and the integration of engineering standards and codes within the technological landscape. This course addresses the ethical challenges faced by engineering technologists and emphasizes the importance of adhering to established standards to ensure the safety, integrity, and societal impact of engineering and technology.

BET 345 - Industrial Operation & Management Practices (3 units)
Industrial Operation and Management Practices is a 3-unit course in operations management with statistics. It covers the relevant concepts and theories of production and operations management as well as the quantitative tools for data analysis and business decision making. It also includes industrial tours to manufacturing, production or business sites to establish a link between theory taught in a classroom and actual practical concept thus contributing to the holistic learning development of students.

By the end of the semester, the student will understand the methods, models and techniques that are used to resolve organizational difficulties equipped with the analytical skills to determine and analyze the complexity of operational management challenges in business, combined with creative thinking to generate potential solutions.

BET 346 - Engineering Technology Management (3 units)
This course provides an in-depth exploration of the multifaceted aspects of leadership, strategic management, and innovation within the dynamic realms of engineering and technology. Aimed at equipping participants with a holistic understanding of effective management practices, this course encompasses a range of topics essential for steering successful engineering projects and navigating the evolving landscape of technology-driven industries.

BET 347 - Technology Capstone Project 2 (3 units)
Technology Capstone Project 2 builds upon the foundation established in Technology Capstone Project 1, providing students with an advanced opportunity to further develop their research, innovation, and problem-solving skills within the realm of technology. This course extends the commitment to preparing students for success in both industrial settings and academia by immersing them in an intensive and collaborative capstone project experience.

Technology Capstone Project 2 is designed to provide students with an immersive and challenging experience in advanced research and development, allowing them to contribute meaningful solutions to complex technological challenges. Through this course, students not only deepen their expertise in their chosen field but also refine their abilities to innovate, collaborate, and communicate effectively, preparing them for leadership roles in technology and research.

Fourth Year – First Semester Courses

BET 441 – Supervised Industrial Training 1 (540 hrs) (6 units)
Supervised Industrial Training 1 (BET 441) is a hands-on way to learn new competencies and skills for a job in a genuine, or nearly actual, working environment.

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Fourth Year – Second Semester Courses

BET 442 – Supervised Industrial Training 2 (540 hrs) (6 units)
Supervised Industrial Training 2 (BET 442) is a continuation of BET 441, which is a hands-on way to learn new competencies and skills for a job in a genuine, or nearly actual, working environment.

XVI. Program Advisory Council

1	Engr. Rea C. Castro Department of Science and Technology Planning Officer III and OIC of Planning and Management Division	Alumni
2	Danissa Mae Macaraig Ibiden Philippines Inc. Senior Technician	Alumni
3	Carmela Antones Como 22-09339@g.batstate-u.edu.ph	Student Stakeholder
4	Princes Joy Garcia Labay 22-02083@g.batstate-u.edu.ph	Student Stakeholder
5	Jovy Ordonia STMicroelectronics, Inc. HR Recruitment Specialist	Industry
6	Bryan Boo Aurotech Corporation Customer Service Manager	Industry
7	Dr. Myra A. Manalo Institute of Electronics Engineers of the Philippines (IECEP) -National Board Director -Adviser, IECEP Batangas Chapter	APO
8	Irish Giselle C. Bautista Assistant Professor IV Doctor in Development Education Batangas State University - Alangilan	Faculty Stakeholder
9	Dr. Virginia A. Blanco Assoc. Prof V Doctor of Technology Batangas State University - Alangilan	Faculty Stakeholder
10	Dr. Oscar Barte Asst. Prof II Doctor of Technology Batangas State University - Alangilan	Faculty Stakeholder
11	Dr. Marian Panganiban	

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	Batangas State University - Balayan	Faculty Stakeholder
12	Gaudencio Panganiban	Faculty Stakeholder
	Batangas State University - Balayan	

XVII. Profile of the Faculty

CORE FACULTY
Magundayao, Eufronia M. Assoc. Prof. III Doctor of Technology
GUEST LECTURERS
Carpio, Estelito C. Jr Lecturer I Bachelor of Science in Mechatronics Engineering Master of Technology (22 units)
Castillo, Christopher B. Lecturer II Bachelor of Industrial Technology Master of Technology (36 units)
GENERAL EDUCATION
Bongares, Maricel B. Lecturer I Bachelor of Science in Chemical Engineering Master in Business Administration (39 units)
Calvelo, Shiela Marie P. Lecturer I Bachelor of Secondary Education major in MAPEH
Garcia, Jeremiah R. Lecturer I Bachelor of Science in Chemical Engineering Master in Business Administration
Macalinga, Angelica Mae C. Lecturer I Bachelor of Secondary Education major in Social Studies Master of Arts in Education major in Social Studies (9 units)
Perez, Gladys P. Lecturer I Bachelor of Science in Mathematics Master of Science in Mathematics (36 units)

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XVIII. Program Administration

Batangas State University – Lipa Campus
College of Engineering Technology

Dr. TIRSO A. RONQUILLO
University President
(By virtue of BoR Resolution No.135, S. 2022)

Dr. EUFRONIA M. MAGUNDAYAO
Vice Chancellor for Academic Affairs

Dr. EUFRONIA M. MAGUNDAYAO
Dean, CET

Mr. PHILIP D. GENETA
Program Chair

XIX. ***Outcomes Mapping***

1. RELATIONSHIP BETWEEN PEO AND MISSION STATEMENT

RELATIONSHIP BETWEEN PEO AND MISSION STATEMENT					
PEO1	**PEO STATEMENTS**	**Innovation**	**Multidisciplinary Research**	**Community & Industry Partnerships**	**Sustainable Development**
PEO1	Successful Professional Practice	x	x	x	
PEO2	Professionalism	x		x	x
PEO3	Technological Advancement	x	x		x

Rationale

The Program Educational Objectives (PEOs) define the desired outcomes of a program and guide program development, assessment, and improvement, while the mission statement defines the overall purpose of the program and how it aims to achieve it. The PEOs in this case are aligned with the program's mission statement, emphasizing innovation, multidisciplinary research, community and industry partnerships, professionalism, and sustainable development. Each PEO focuses on different aspects, including successful professional practice, professionalism, and technology advancement, all of which contribute to developing graduates who can positively impact society and the environment.

2. RELATIONSHIP BETWEEN SO AND PEO

RELATIONSHIP BETWEEN SO AND PEO				
SO	**SO STATEMENTS**	**Technologists**	**Professionalism**	**Technology Advancement**
		PEO1	**PEO2**	**PEO3**
SO1	Problem Analysis	x		x
SO2	Design/Development of Solutions	x		x
SO3	Communication		x	
SO4	Investigation	x		
SO5	Leadership and Teamwork	x		
SO6	Ethics and Professionalism		x	
SO7	Lifelong Learning		x	
SO8	Social and National Responsibility		x	

Rationale

The relationship between program educational objectives (PEOs) and student outcomes (SOs) is crucial to ensure that students acquire the necessary knowledge, skills, and competencies to succeed in their chosen profession. The alignment between PEOs and SOs is particularly important, as it specifies the desired outcomes of the program.

PEO 1 (Successful Professional Practice) aligns with SO1 (Problem Analysis), SO2 (Design/Development of Solutions), SO4 (Investigation), and SO5 (Leadership and Teamwork). PEO 2 (Professionalism) aligns with SO3 (Communication), SO6 (Evaluation of the Problem), and SO7 (Communication). PEO 3 (Technology Advancement) aligns with SO1 (Problem Analysis) and SO2 (Design/Development of Solutions).

This alignment implies that students who have mastered these SOs will be able to solve problems, design effective solutions, evaluate problems critically, communicate their ideas effectively, engage in lifelong learning, act ethically and professionally, and contribute to the betterment of society and the nation.

3. RELATIONSHIP BETWEEN SO AND IGA

RELATIONSHIP BETWEEN SO AND IGA									
SO	**SO STATEMENTS**	**Knowledge Competence**	**Creativity and Innovation**	**Critical and Systems Thinking**	**Communication**	**Lifelong Learning**	**Leadership, teamwork, and interpersonal skills**	**Global Outlook**	**Social and National Responsibility**
		IGA1	**IGA2**	**IGA3**	**IGA4**	**IGA5**	**IGA6**	**IGA7**	**IGA8**
SO1	Problem Analysis			x					
SO2	Design/Development of Solutions						x		
SO3	Communication				x				
SO4	Investigation		x						
SO5	Leadership and Teamwork			x					
SO6	Ethics and Professionalism					x			
SO7	Lifelong Learning								x
SO8	Social and National Responsibility							x	

Rationale

The process of mapping student outcomes to program educational objectives plays a crucial role in ensuring that the curriculum meets the needs of the industry and equips graduates with the necessary competencies required by employers. The student outcomes encompass a range of skills and

knowledge, including technology problem analysis, design/development of solutions, communication, investigation, leadership and teamwork, ethics and professionalism, lifelong learning and social and national responsibility. These outcomes are then mapped to specific program educational objectives, such as knowledge competence, critical and system thinking, creativity and innovation, leadership, teamwork and interpersonal skills, communication, lifelong learning, ethics and professionalism, and global outlook. The mapping process ensures that each student outcome is aligned with a specific program educational objective and is covered in the curriculum, helping students to acquire a broad range of competencies and skills necessary for success in the workplace.

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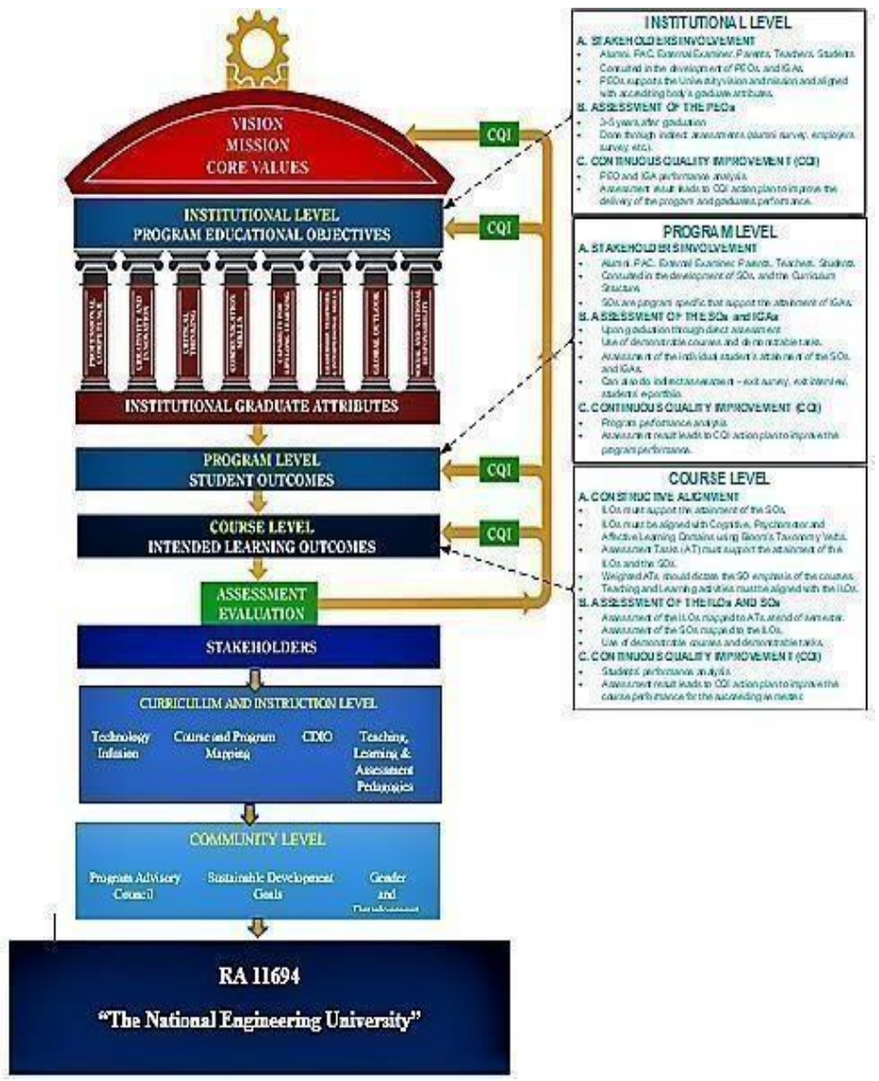
XX. Batangas State University Enhanced OBE Framework



(Revised as of January 2023)

Attachments

Republic of the Philippines
BATANGAS STATE UNIVERSITY
The National Engineering University
Lipa Campus
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Tel Nos.: (+63 43) 980-0385; 980-0387; 980-0392 to 94 local 3129
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Comparison of PCS with CMO of the Program and ABET-ETAC

Specific Areas of the Program Curriculum			CMO No. 13 S.2023 BIndTech AT	BatStateU	ABET-ETAC		Remarks
				Proposed - BELXET	General Criteria	Program Criteria (PC)	
Required General Education							
No.	**Course Code**	**Course Title**	**Units**	**Units**			
1	GEd 101	Understanding the Self	3	3			
2	GEd 102	Mathematics in the Modern World	3	3			
3	GEd 104	The Contemporary World	3	3			
4	GEd 105	Readings in Philippine History	3	3			
5	GEd 106	Purposive Communication	3	3			
6	GEd 107	Ethics	3	3			
7	GEd 108	Art Appreciation	3	3			
8	GEd 109	Science, Technology, and Society	3	3			
		Sub-total	**24**	**24**			
Mandated Courses							
1	GEd 103	Life and Works of Rizal	3	3			
		Sub-total	**3**	**3**			
Elective Course							
1	Litr102	ASEAN Literature	0	3			
2	GAD101	Gender and Society	0	3			
3	ES101	Environmental Science	0	3			
		Sub-total	**0**	**9**			
PATHFit & NSTP							
1	PATHFit 1	Movement Competency Training	2	2			
2	PATHFit 2	Exercise-based Fitness Activities	2	2			
3	PATHFit 3	Traditional and Recreational Games	2	2			
4	PATHFit 4	Team Sports (Basketball and Volleyball)	2	2			
5	NSTP 111	National Service Training Program 1	3	3			
6	NSTP 121	National Service Training Program 2	3	3			
		Sub-total	**14**	**14**			
Math and Sciences Courses							
1	MathET140	Comprehensive Math (Algebra, Trigonometry, Analytic Geometry)	5	0	**M.b**		
2	MathET141	Differential Calculus for BET	0	3	**M.b**		
3	MathET241	Integral Calculus for BET	0	3	**M.b**		
4	MathET242	Probability and Statistics	0	3	**M.b**		
5	SciET141	Chemistry	3	4	**PNS**		
6	SciET142	Physics	3	4	**PNS**		
		Sub-total	**11**	**17**			

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Management and Tool Courses							
1	CpET140	Computer Programming	3	3	**DSC.b**	**PCA.a**	
2	BET141	Production Drawing	2	3	**DSC.d**		
3	BET142	Computer Aided Design	2	2	**DSC.b**		
4	BET143	Occupational Health and Industrial Safety Management	3	3	**DSC.d**	**PCA.a**	
5	BET 241	Materials Selection & Testing	0	3			
6	BET 341	Quality Control and Assurance	3	3	**DSC.d**		
7	BET 342	Technopreneurship for BET	3	3		**PCA.d**	
8	BET344	Engineering Technology Ethics	0	3	**OC**		
9	BET 345	Industrial Operation & Management Practices	3	3	**DSC.d**	**PCA.d**	
10	BET 346	Engineering Technology Management	-	3	**DSC.d**	**PCA.d**	
		Sub-total	**19**	**29**			
Professional Courses							
1	ELXET 141	Electronics Laws and Standards		2		**PCA.a**	
2	ELET 141	Circuit Analysis I		3		**PCA.a, PC.b**	
3	ELXET 142	Electronic Devices		3		**PCA.a**	
4	ELET 143	Circuit Analysis II		3		**PCA.a, PC.b**	
5	ELXET 143	Digital Electronics		3		**PCA.a**	
6	MEXT 342	Electro-Peumatics and Electro-Hydraulics		3		**PCA.c**	
7	MXET 244	Programmable Logic Control		3		**PCA.a**	
8	ELXET 144	Instrumentation Measurement and Laboratory		3		**PCA.c**	
9	MXET342	Control System		3		**PCA.c**	
10	ELXET 241	Microcontroller System		3		**PCA.a**	
11	ELXET 242	Analog and Digital Signal Analysis		3		**PCA.c, PCA.e**	
12	ELXET 341	Communications System I		3		**PCA.c, PCA.e**	
13	ELXET 342	Power Electronics		3		**PCA.c**	
14	ELXET 343	Introduction to Robotics and Automation		3		**PCA.e**	
15	ELXET 344	Advanced Automation Controller Systems		3		**PCA.c**	
16	ELXET 345	Electrical Machines and Power Systems		3		**PCA.c**	
17	BET343	Technology Capstone Project 1	3	3		**IC, CA.d**	
18	BET347	Technology Capstone Project 2	3	3		**IC, CA.d**	
19	BET441	Supervised Industrial Training 1	6	6		**CE,DSC.e**	
20	BET442	Supervised Industrial Training 2	6	6		**CE,DSC.e**	
		Sub-total	**64**	**65**			

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BIndTech Other Courses							
1		Foreign Language	3	0			
2		Introduction to Information Technology	3	0			
3		Industrial Psychology	3	0			
4		Production Management	3	0			
5		Materials Technology Management	3	0			
6		GE Elective 1	3	0			
7		GE Elective 2	3	0			
8		GE Elective 3	3	0			
		Sub-total	**24**	**0**			
		Grand Total	**155**	**161**			

Note: ABET-ETAC General Criteria	
Code	***Mathematics - The curriculum provides***
M.a	a. For an Associate program, the application of algebra and trigonometry appropriate to the student outcomes and the discipline.
M.b	b. For a Baccalaureate program, the application of integral and differential calculus or other mathematics above the level of algebra and trigonometry appropriate to the student outcomes and the discipline.
Discipline Specific Content (DSC) - The curriculum must focus on the applied aspects of science and engineering and must	
DSC. a	a. Represent at least one-third, but no more than two-thirds of the total credit hours for the curriculum.
DSC. b	b. Include a technical core preparing students for increasingly complex technical specialties later in the curriculum.
DSC.c	c. Develop student competency in the discipline.
DSC. d	d. Include design; appropriate to the discipline such as: industry and engineering standards and codes; public safety and health; and local and global impact of engineering solutions on individuals, organizations and society.
DSC.e	e. Combine technical, professional, and general education components to prepare students for a career, further study, and lifelong professional development.
OC	Other Content - Include topics related to professional and ethical responsibilities, diversity and inclusion awareness,
PNS	Physical and Natural Science - The program provides physical or natural science content of the curriculum appropriate to the discipline and includes laboratory experiences.

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IC	Integration of Content - Baccalaureate degree programs must provide a capstone or other integrating experiences that develop student competencies in applying both technical and nontechnical skills in problem solving.
CE	Cooperative Education - When used to satisfy prescribed elements of these criteria, cooperative internships or similar experiences must include an appropriate academic component evaluated by the program faculty.

	Program Criteria (PC)
PC.a	a. the application of circuit analysis and design, computer programming, associated software, analog and digital electronics, and microcomputers, and engineering standards to the building, testing, operation, and maintenance of electrical/electronic(s) systems;
PC.b	b. the application of natural sciences and mathematics at or above the level of algebra and trigonometry to the building, testing, operation, and maintenance of electrical/electronic systems;
PC.c	c. the ability to analyze, design, and implement one or more of the following: control systems, instrumentation systems, communications systems, computer systems, or power systems;
PC.d	d. the ability to apply project management techniques to electrical/electronic(s) systems; and
PC.e	e. the ability to utilize differential and integral calculus, as a minimum, to characterize the performance of electrical/electronic systems.

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Student Outcomes Mapping

Proposed BET SO to BIndTech SO

No.		BIndTech SO							
		1	2	3	4	5	6	7	8
BET SO	1	✓							
	2		✓						
	3				✓				
	4			✓					
	5					✓			
	6						✓		
	7							✓	✓
	8		✓						

Proposed BET SO to ABET-ETAC SO

No.		ABET ETAC SO				
		1	2	3	4	5
BET SO	1	✓				
	2		✓			
	3			✓		
	4				✓	
	5					✓
	6		✓			
	7				✓	
	8		✓			