Republic of the Philippines
BATANGAS STATE UNIVERSITY
The National Engineering University
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College of Engineering

CURRICULUM

Bachelor of Science in Electrical Engineering (BSEE)

Academic Year 2023-2024

Reference CMOs: CMO No. 88 s. 2017, CMO No. 39, s. 2021, CMO No. 4 s. 2018 and CMO No. 20, s. 2013, CMO No. 40, s. 2021

Curriculum Description

Electrical Engineering is a profession that involves the conceptualization, development, design, improvement and application of safe, healthy, ethical and economical way of utilizing materials and energy in unit Processes and operations for the benefit of society and the environment through the knowledge of mathematics, chemistry, biology, information technology and other natural, applied and social sciences, gained by study, research and practice.

Program Educational Objectives of Electrical Engineering

The electrical engineering alumni three to five years after graduation shall:

1. Demonstrate professional; expertise through analytical and innovative thinking for the purpose of solving industry-based engineering problems design of advanced electrical system and involvement in research-oriented projects.
2. Engage their engineering profession in the globally competitive environment through continuous professional education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers
3. Exhibit holistic leadership and professionalism, through peer-recognized expertise in team-based environments as agents of sustainable economic development.

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 Thinking.** 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.

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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.

Student Outcomes

The following skills, knowledge and behaviors are expected to be attained by students as they progress through the program:

1. **Discipline Knowledge.** Ability to apply mathematics, sciences and principles of engineering to solve complex electrical engineering problems;

2. **Investigation.** Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions;

3. **Design/Development of Solutions.** Design solution, system, components, processes, exhibiting improvements/innovations, that meet specified needs with appropriate consideration for public health and safety, cultural, societal, economical, ethical, environmental and sustainability issues.

4. **Leadership and Teamwork.** Function effectively as a member of a leader on a diverse team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

5. **Problem Analysis.** Identify, formulate, and solve complex electrical engineering problems by applying principles of engineering, science, and mathematics;

6. **Ethics and Professionalism.** Apply ethical principles and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, environmental, and societal contexts.

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7. **Communication.** Communicate effectively on complex electrical engineering activities with the community, and the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;

8. **Environment and Sustainability.** Recognize the impact of professional engineering solutions in societal, global, and environmental contexts and demonstrate knowledge of and need for sustainable development;

9. **Lifelong Learning.** Recognize the need for, and ability to engage in independent and life-long learning in the broadest context of technological change.

10. **The Engineer and Society.** Apply reasoning based on contextual knowledge to assess societal, health, safety, legal, cultural, contemporary issues, and the consequent responsibilities relevant to professional engineering practices.

11. **Modern Tool Usage.** Apply appropriate techniques, skills, and modern engineering and IT tools to complex electrical engineering activities;

12. **Project Management and Finance.** Demonstrate knowledge and understanding of engineering management and financial principles as member or a leader of a team to manage projects in multidisciplinary settings, and identify opportunities of entrepreneurship.

13. **Social and National Responsibility.** Apply acquired electrical engineering knowledge and skills in addressing community problems that contributes to national development.

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CURRICULUM COMPONENTS

Classification/ Field / Course	No. of Hours/Week		Credit Units
	Lec	Lab	
Technical Courses			
Mathematics			
Calculus 1	3	0	3
Calculus 2	3	0	3
Engineering Data Analysis	3	0	3
Differential Equations	3	0	3
Natural/Physical Sciences			
Chemistry for Engineers	3	3	4
Physics for Engineers	3	3	4
Modern Biology	2	3	3
Engineering Sciences			
Computer-aided Design	0	3	1
Engineering Mechanics	3	0	3
Engineering Economics	3	0	3
Technoprenuership	3	0	3
Engineering Management	2	0	2
Introduction to Engineering	0	3	1
Engineering Drawing	0	3	1
Allied Courses			
Fundamentals of Deformable Bodies	3	0	3
Material Science and Engineering	3	0	3
Electronic Circuits: Devices and Analysis	3	3	4
Thermodynamics	3	0	3
Industrial Electronics	3	3	4
Electromagnetics	4	0	4
Fluid Mechanics	3	0	3
Fundamentals of Electronic Communications	3	0	3
Logic Circuits and Switching Theory	2	3	3
Microprocessor Systems	3	0	3
Computer Programming	0	3	1
Basic Occupational Safety and Health	3	0	3
Discrete Math	3	0	3
Environmental Science and Engineering	2	0	2
Professional Courses			
Numerical Methods and Analysis	2	3	3
Electrical Circuits 1	3	3	4
Electrical Circuits 2	3	3	4
Engineering Mathematics for EE	3	0	3
Electrical Machines 1	3	3	4
Electrical Apparatus and Devices	2	3	3
Electrical Machines 2	3	3	4
EE Laws, Contacts and Professional Ethics	2	0	2
Feedback Control System	3	0	3
Electrical Standards and Practices	0	3	1
Power System Analysis	4	3	5
Instrumentation and Control	2	3	3
Electrical Systems and Illumination Design	3	6	5
Fundamentals of Power Plant Engineering Design	2	3	3
Electrical Transmission, Distribution Systems and Substation Design	2	3	3

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Research Methods	3	0	3
EE Design Project 1	0	3	1
EE Design Project 2	0	3	1
Electrical Maintenance and Operations	3	0	3
Seminars/Colloquia	0	3	1
On-the-Job Training	320 hrs		4
Electives 1,2	6	0	6
EE Practice with Comprehensive Examination	0	6	2
SUB-TOTAL	**118**	**84**	**150**
Non - Technical Courses			
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
Electives Mandated Courses			
Kontekstwalisadong Komunikasyon sa Filipino	3	0	3
Filipino sa Iba't Ibang Disiplina	3	0	3
ASEAN Literature	3	0	3
Life and Works of Rizal	3	0	3
Physical Activities Towards Health and Fitness			
PATHFit 1 – Movement Competency Training	2	0	2
PATHFit 2 – Exercise-based Fitness Activity	2	0	2
PATHFit 3 Menu of dance, sports, Martial Arts, Group Exercise, Outdoor and Adventure Activities Menu Offering; Traditional and Recreational Games	2	0	2
PATHFit 4 Menu of dance, sports, Martial Arts, Group Exercise, Outdoor and Adventure Activities Menu Offering; Team Sports (Basketball and Volleyball)	2	0	2
NSTP 1, 2	6	0	6
SUB-TOTAL	**50**	**0**	**50**
GRAND TOTAL	**168**	**84**	**200**

SUMMARY	
Courses	**Number of Units**
I. Technical Courses	
A. Mathematics	12
B. Natural/Physical Sciences	11
C. Basic Engineering Sciences	14
D. Allied Courses	42
E. Professional Courses	71
II. Non-Technical Courses	
A. General Education Courses	24
B. Filipino/Literature/Mandated Courses	12
C. Physical Activities Towards Health and Fitness (PATHFit) 1-4	8
D. NSTP	6
GRAND TOTAL	**200**

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PROGRAM OF STUDY

FIRST YEAR						
First Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
GEd 102	Mathematics in the Modern World	3	0	3		
GEd 105	Readings in Philippine History	3	0	3		
GEd 101	Understanding the Self	3	0	3		
SCI 401	General Chemistry	3	3	4		
GEd 106	Purposive Communication	3	0	3		
ENGG 401	Introduction to Engineering	0	3	1		
MATH 401	Differential Calculus	3	0	3		
PATHFit 1	Movement Competency Training	2	0	2		
NSTP 111	National Service Training Program 1	3	0	3		
	Total	**23**	**6**	**25**		

FIRST YEAR						
Second Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
MATH 402	Integral Calculus	3	0	3	MATH 401	
SCI 403	Physics 1	3	3	4	MATH 401	MATH 402
GEd 104	The Contemporary World	3	0	3		
GEd 109	Science, Technology and Society	3	0	3		
GEd 108	Art Appreciation	3	0	3		
CpE 401	Computer Programming 1	0	3	1		
ENGG 402	Engineering Drawing	0	3	1		
PATHFit 2	Exercise-based Fitness Activities	2	0	2	PATHFit 1	
NSTP 121	National Service Training Program 2	3	0	3	NSTP 111	
	Total	**20**	**9**	**23**		

FIRST YEAR						
Midterm						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
SCI 402	Modern Biology	2	3	3		
GEd 103	Life and Works of Rizal	3	0	3		
GEd 107	Ethics	3	0	3		
	Total	**8**	**3**	**9**		

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SECOND YEAR						
First Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
MATH 403	Engineering Data Analysis	3	0	3	MATH 401	
MATH 404	Differential Equations	3	0	3	MATH 402	
ENGG 409	Engineering Mechanics	3	0	3	SCI 403	
EE 401	Electrical Circuits 1	3	3	4	MATH 402, SCI 403	
Fili 101	Kontekstwalisadong Komunikasyon sa Filipino	3	0	3		
ECE 401	Electromagnetics	4	0	4	SCI 403	MATH 404
ME 431	Thermodynamics	3	0	3	SCI 403, MATH 402	
ENGG 403	Computer-Aided Design	0	3	1	ENGG 402	
PATHFit 3	Menu of dance, sports, Martial Arts, Group Exercise, Outdoor and Adventure Activities Menu Offering; Traditional and Recreational Games	2	0	2	PATHFit 1, PATHFit 2	
	Total	**24**	**6**	**26**		

SECOND YEAR						
Second Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
EE 402	Advanced Mathematics for EE	3	0	3	MATH 404	
ENGG 410	Fundamentals of Deformable Bodies	3	0	3	ENGG 409	
EE 403	Electrical Circuits 2	3	3	4	EE 401	EE 402
ECE 421	Electronic Circuits: Devices and Analysis	3	3	4	EE 401	
Fili 102	Filipino sa Iba't Ibang Disipllina	3	0	3		
EE 404	Electrical Machines 1	3	3	4	EE 401, ECE 401	
CpE 405	Discrete Mathematics	3	0	3	MATH 402	
PATHFit 4	Menu of dance, sports, Martial Arts, Group Exercise, Outdoor and Adventure Activities Menu Offering; Team Sports (Basketball and Volleyball)	2	0	2	PATHFit 1, PATHFit 2	
	Total	**23**	**9**	**26**		

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THIRD YEAR						
First Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
ENGG 415	Numerical Methods and Analysis	2	3	3	MATH 404, CpE 401	
CpE 409	Logic Circuits and Switching Theory	2	3	3	ECE 421	
EE 406	Electrical Machines 2	3	3	4	EE 403, EE 404	EE 405
ENGG 412	Materials Science and Engineering	3	0	3	SCI 401, ENGG 409	
ENGG 404	Engineering Economics	3	0	3	MATH 403	
ECE 423	Fundamentals of Electronic Communications	3	0	3	ECE 421	
EE 407	EE Laws, Contacts and Professional Ethics	2	0	2	3rd year standing	
EE 405	Electrical Apparatus and Devices	2	3	3	EE 403, EE 404	
Litr 102	ASEAN Literature	3	0	3		
	Total	**23**	**12**	**27**		

THIRD YEAR						
Second Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
ENGG 416	Research Methods	3	0	3	MATH 403	
EE 410	Power System Analysis	4	3	5	EE 406	EE 409
ENGG 413	Environmental Science and Engineering	2	0	2	SCI 401	
ECE 424	Industrial Electronics	3	3	4	ECE 421	
EE 408	Feedback Control System	3	0	3	EE 402, ECE 421	
EE 409	Electrical Standards and Practices	0	3	1	EE 407	
CpE 416	Microprocessor Systems	3	0	3	CpE 409	
EEE 401	EE Elective 1: Solar Energy	3	0	3	3rd year standing	
	Total	**21**	**9**	**24**		

THIRD YEAR						
Midterm						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
ENGG 406	Engineering Management	2	0	2		
ME 406	Fluid Mechanics	3	0	3	ENGG 410	
ENGG 411	Basic Occupational Safety and Health	3	0	3		
	Total	**8**	**0**	**8**		

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FOURTH YEAR						
First Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
ENGG 417	On-the-Job Training	320		4	4th year standing	
ENGG 405	Technopreneurship	3	0	3	4th year standing	
EEE 402	EE Elective 2: Biogas/Biomass Energy	3	0	3	EEE 401	
EE 411	EE Design Project 1	0	3	1	4th year standing	
	Total	**6**	**3**	**11**		

FOURTH YEAR						
Second Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
EE 412	Electrical Systems and Illumination Design	3	6	5	EE 410	
EE 413	Fundamentals of Power Plant Engineering Design	2	3	3	EE 410	
EE 414	Transmission, Distribution Systems and Substation Design	2	3	3	EE 410	
EE 415	EE Design Project 2	0	3	1	Graduating	
EE 416	Electrical Maintenance and Operations	3	0	3	4th year standing	
EE 417	Seminars/Colloquia	0	3	1	Regular Standing	
EE 418	Electrical Engineering Practice with Comprehensive Examination	0	6	2	Graduating	
ICE 420	Instrumentation and Control	2	3	3	EE 408	
	Total	12	27	21		
GRAND TOTAL UNITS		**168**	**84**	**200**		

EE Elective Tracks:

- Renewable Energy for Sustainable Development
  - Solar Energy
  - Biogas/Biomass Energy
- Machine Automation and Process Control
  - Pneumatic and Electropneumatics
  - Programmable Logic Controlled in Manufacturing & Power Systems