UNIVERSITY OF ST. LA SALLE

Bachelor of Science in Electrical Engineering (BSEE)

Program Description

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

Program Educational Objectives

Within three to five years after obtaining a bachelor's degree in Electrical Engineering at University of St. La Salle, graduates are expected to:

1. Become innovative practicing electrical engineers engage in the analysis, design, and implementation of electrical and control systems and in the operation, control, and maintenance of electrical machines, equipment, and devices.
2. Obtain excellent communication, interpersonal, management skills needed to meet the demands of their work.
3. Develop a sense of responsibility and social awareness and commitment to the continuous development of the electrical engineering profession.

Program Outcomes

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

a. Apply knowledge of mathematics, chemistry, physics, information technology, and other engineering principles and techniques to solve engineering problems and completing tasks in the real world.
b. Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
c. Design solutions for complex engineering problems and design systems, components or processes using technology and innovative methods, that meet specified needs with appropriate consideration for public health and safety, ethics cultural, societal, and environment considerations.
d. Function effectively and confidently as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
e. Identify, formulate, use other technological information to solve problems related to the generation, transmission, distribution, and utilization of electrical energy.
f. Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
g. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentation, and give and receive clear instructions.
h. Understand and assess the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.

i. Recognize the need for new knowledge and the ability to engage in independent and lifelong learning in the broadest context of technological change.
j. Articulate and discuss the latest technological developments in the field of electrical engineering with emphasis on the care, protection, and preservation of the environment.
k. Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to solve complex engineering problems.
l. Demonstrate knowledge and understanding of engineering management principles and economic decision making and apply these to one's work, as a member and leader in a team, to manage projects in multidisciplinary environments.

Admission Requirements

1. Students seeking admission to the program must have a weighted average of at least 80% in the report card;
2. Students admitted on probation must comply with the terms and conditions set by the University.

Retention Policies

A student will be permanently dismissed from the BSEE program due to any of the following reasons:

1. If he/she incurs a total of 30 units of failures;
2. If a student incurs 18 units of failure in one semester.

UNIVERSITY OF ST. LA SALLE

BACHELOR OF SCIENCE
Electrical Engineering

FIRST YEAR

First Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
EMA100	Algebra and Trigonometry	3	2	3	5		
EMA101	Calculus 1	4	4	0	4		EMA100-Algebra & Trig
CHM101E	Chemistry for Engineers (Lec)	4	4	0	4		
CHM101EL	Chemistry for Engineers (Lab)	1	0	3	3		CHM101E-Chemistry for Engineer (Lec)
GE101	Engineering Drawing	1	0	3	3		
MATHMW	Mathematics in the Modern World	3	3	0	3		
IGG	Group Guidance 1	1.5	1.5	0	1.5		
IRS1	Lasallian Spirituality	3	3	0	3		
STS	Science, Technology and Society	3	3	0	3		
PED1	Physical Education 1 (Wellness & fitness)	2	2	0	2		
NSTP1	NSTP 1	3	3	0	3		
	Total	**28.5**	**25.5**	**9**	**34.5**		

Second Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
EMA102	Calculus 2	4	4	0	4	EMA101-Calculus 1	
PHY101E	Physics for Engineers (Lec)	4	4	0	4		EMA102-Calculus 2
PHY101EL	Physics for Engineers (Lab)	1	0	3	3		PHY101E-Physics for Engineers (Lec)
GE201	Computer-Aided Drafting	1	0	3	3	GE101-Engineering Drawing	
CWRLD	The Contemporary World	3	3	0	3		
PCOM	Purposive Communication	3	3	0	3		
PED2	Physical Education 2 (Team Sports and Rhythmic Activities)	2	2	0	2		
NSTP2	NSTP 2	3	3	0	3		
IRS2	Christian Morality	3	3	0	3		
	Total	**24**	**22**	**6**	**28**		

SECOND YEAR

First Semester		**Total Credit Units**	**No. of hrs Lec**	**Lab**	**Total Assessed Units**	**Pre-requisite**	**Co-requisite**
EMA103	Differential Equations	3	3	0	3	EMA102 - Calculus 2	
EE201	Electrical Circuits 1(Lec)	4	4	0	4	PHY101E- Physics for Engineers; EMA102- Calculus 2	
EE201L	Electrical Circuits 1 (Lab)	1	0	3	3		EE201 - Electrical Circuits 1 (Lec)
CFP101	Computer Programming	1	0	3	3		
EMA104	Engineering Data Analysis	3	3	0	3	EMA101- Calculus 1	
GE102	Engineering Mechanics	3	3	0	3	PHY101E- Physics for Engineers	
ARTAP	Art Appreciation	3	3	0	3		
GBOOKS	Great Books	3	3	0	3		
PED3	Physical Education 3 (Swimming & Recreation)	2	2	0	2		
IRS3	Spirituality in the Workplace	3	3	0	3		
	Total	**26**	**24**	**6**	**30**		

Second Semester		**Total Credit Units**	**No. of hrs Lec**	**Lab**	**Total Assessed Units**	**Pre-requisite**	**Co-requisite**
EE202	Electrical Circuits 2 (Lec)	4	4	0	4	EE201 - Electrical Circuits 1	
EE202L	Electrical Circuits 2 (Lab)	1	0	3	3		EE202- Electrical Circuits 2 (Lec)
EE203	Electromagnetics	3	3	0	3	PHY101E- Physics for Engineers; EMA103- Differential Equations	
EE204	Electronic Circuits, Devices, and Analysis (Lec)	3	3	0	3	EE201 - Electrical Circuits 1	
EE204L	Electronic Circuits, Devices, and Analysis (Lab)	1	0	3	3		EE204 - Electronic Circuits, Devices, and Analysis (Lec)
EMA203	Engineering Math for EE	3	3	0	3	EMA103- Differential Equations	
GE202	Fundamental of Deformable Bodies	2	2	0	2	GE102- Engineering Mechanics	

GE203	Basic Thermodynamics	2	2	0	2	PHY101E-Physics for Engineers
PED4	Physical Education 4 (Individual and Dual Sports)	2	2	0	2	
USELF	Understanding the Self	3	3	0	3	
	Total	**24**	**22**	**6**	**28**	

THIRD YEAR

First Semester		**Total Credit Units**	**No. of hrs Lec**	**Lab**	**Total Assessed Units**	**Pre-requisite**	**Co-requisite**
EE301	Electrical Machines 1 (Lec)	2	2	0	2	EE203-Electromagnetics; EE202-Electrical Circuits 2	
EE301L	Electrical Machines 1 (Lab)	1	0	3	3		EE301-Electrical Machines 1 (Lec)
EE304	Fundamentals of Electronic Communication	3	3	0	3	EE204 - Electronic Circuits, Devices, & Analysis	
EE305	Logic Circuits & Switching Theory (Lec)	2	2	0	2	EE204 - Electronic Circuits, Devices, & Analysis	
EE305L	Logic Circuits & Switching Theory (Lab)	1	0	3	3		EE305-Logic Circuits & Switching Theory (Lec)
EE306	Industrial Electronics (Lec)	3	3	0	3	EE204 - Electronic Circuits, Devices, & Analysis	
EE306L	Industrial Electronics(Lab)	1	0	3	3		EE306-Industrial Electronics (Lec)
EMA301	Numerical Methods (Lec)	2	2	0	2	EMA203-Engineering Math for EE	
EMA301L	Numerical Methods (Lab)	1	0	3	3		EMA301-Numerical Methods (Lec)
GE106	Engineering Economics	3	3	0	3	EMA104-Engineering Data Analysis	
ETHICS	Ethics	3	3	0	3		
LOGIC	Logic	3	3	0	3		
EIA1E	Engineering Intensive Appraisal 1 for EE	1	0	3	3	3rd Year Standing	
	Total	**26**	**21**	**15**	**36**		

Second Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
EE302	Electrical Machines 2 (Lec)	3	3	0	3	EE301-Electrical Machines 1	
EE302L	Electrical Machines 2 (Lab)	1	0	3	3		EE302-Electrical Machines 2 (Lec)
EE303	Electrical Apparatus and Devices (Lec)	2	2	0	2	EE202-Electrical Circuits 2	
EE303L	Electrical Apparatus and Devices (Lab)	1	0	3	3		EE303-Electrical Apparatus and Devices (Lec)
EE307	Microprocessor Systems	2	2	0	2	EE305-Logic Circuits &Switching Theory	
EE308	Feedback and Control Systems	2	2	0	2	EMA203-Engineering Math for EE; EE204 - Electronic Circuits, Devices, & Analysis	
EE309	EE Law, Codes, and Professional Ethics	2	2	0	2	ETHICS-Ethics	
GE105	Environmental Science and Engineering with GIS	3	3	0	3		
GE113	Fluid Mechanics	2	2	0	2	PHY101E-Physics for Engineers	
GE204	Basic Occupational Safety and Health	3	3	0	3		
PSPEAK	Public Speaking in the Discipline	3	3	0	3		
EIA2E	Engineering Intensive Appraisal 2 for EE	1	0	3	3	3rd Year Standing	
	Total	**25**	**22**	**9**	**31**		

Summer		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
On-the-Job Training		2	0	240 hrs	2	4th Year Standing	
	Total	**2**	**0**	**240 hrs**	**2**		

FOURTH YEAR

First Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
EE401	Electrical Systems Design (Lec)	3	3	0	3	EE302-Electrical Machines 2	
EE401L	Electrical Systems Design (Lab)	1	0	3	3		EE401-Electrical Systems Design (Lec)
EE402	Illumination Engineering Design	1	0	3	3		EE401-Electrical Systems Design
EE403	Power Systems Analysis (Lec)	3	3	0	3	EE302-Electrical Machines 2; EE303-Electrical Apparatus & Devices;	
EE403L	Power Systems Analysis (Lab)	1	0	3	3		EE404-Electrical Standards & Practices; EE403 - Power Systems Analysis (Lec)
EE404	Electrical Standards and Practices	1	0	3	3	EE309 - EE Laws, Codes, & Professional Ethics	
EE405	Research Methods for EE	1	0	3	3	EMA104-Engineering Data Analysis	
EE406	Instrumentation and Control (Lec)	2	2	0	2	EE308-Feedback and Control Systems	
EE406L	Instrumentation and Control (Lab)	1	0	3	3		EE406-Instru-mentation and Control (Lec)
GE205	Management of Engineering Projects	2	2	0	2	GE106-Engineering Economics	
GE104E	Material Science and Engineering	2	2	0	2	CHM101E-Chemistry for Engineers; GE202-Fundamental of Deformable Bodies	

GE108	Technopreneurship	3	3	0	3	4th Year Standing	
EIA3E	Engineering Intensive Appraisal 3 for EE	1	0	3	3	4th Year standing	
LITE	Living in the IT Era	3	3		3		
	Total	**25**	**18**	**21**	**39**		

Second Semester		**Total Credit Units**	**No. of hrs Lec**	**Lab**	**Total Assessed Units**	**Pre-requisite**	**Co-requisite**
EE407	Distribution Systems/Substation Design(Lec)	3	3	0	3	EE403 - Power System Analysis	
EE407L	Distribution Systems/Substation Design(Lab)	1	0	3	3		EE407- Distribution Systems/ Substation Design (Lec)
EE408	Fund of Power Plant Engg Design	1	0	3	3	EE403 - Power System Analysis	
EE409	Research Project	1	0	3	3	EE405- Research Methods	
EE410	Seminars/Colloquia	1	0	3	3	4th Year Standing	
EELEC401	Professional Elective 1	3	3	0	3	EE403 - Power System Analysis	
EELEC402	Professional Elective 2	3	3	0	3	EELEC401- Professional Elective 1	
RHIST	Readings in the Philippine History	3	3	0	3		
RIZAL	Rizal	3	3	0	3		
EIA4E	Engineering Intensive Appraisal 4 for EE	1	0	3	3	4th Year Standing	
GENSOC	Gender and Society	3	3	0	3		
	Total	**23**	**18**	**15**	**33**		

UNIVERSITY OF ST. LA SALLE

SUMMARY OF REQUIRED COURSES
BS Electrical Engineering

	No. of Course Required	Unit Equivalent	Total Units
Technical Course			
Mathematics			
Algebra/Trigonometry	1	3	
Calculus 1 (Differential Calculus)	1	4	
Calculus 2 (Integral Calculus)	1	4	
Differential Equations	1	3	
Engineering Data Analysis	1	3	17
Natural/Physical Sciences			
Chemistry for Engineers	1	4	
Chemistry for Engineers Lab	1	1	
Physics for Engineers	1	4	
Physics for Engineers Lab	1	1	10
Basic Engineering Sciences			
Engineering Drawing	1	1	
Computer-Aided Drafting	1	1	
Engineering Mechanics	1	3	
Engineering Economics	1	3	
Technopreneurship	1	3	11
Allied Courses			
Fundamental of Deformable Bodies	1	2	
Material Science and Engineering	1	2	
Electronic Circuits, Devices, and Analysis	1	3	
Electronic Ckts, Devices, and Analysis Lab	1	1	
Basic Thermodynamics	1	2	
Industrial Electronics	1	3	
Industrial Electronics Lab	1	1	
Electromagnetics	1	3	
Fluid Mechanics	1	2	
Fundamentals of Electronic Communication	1	3	
Logic Circuits & Switching Theory	1	2	
Logic Circuits & Switching Theory Lab	1	1	
Microprocessor Systems	1	2	
Computer Programming	1	1	
Basic Occupational Safety and Health	1	3	
Environmental Science and Engg with GIS	1	3	34
Professional Courses			
Numerical Methods	1	2	
Numerical Methods Lab	1	1	
EE Laws, Codes, Professional Ethics	1	2	
Electrical Standards and Practices	1	1	
Electrical Circuits 1	1	4	
Electrical Circuits 1 Lab	1	1	
Electrical Circuits 2	1	4	
Electrical Circuits 2 Lab	1	1	
Electrical Apparatus and Devices	1	2	
Electrical Apparatus and Devices Lab	1	1	
Electrical Machines 1	1	2	
Electrical Machines 1 Lab	1	1	
Electrical Machines 2	1	3	
Electrical Machines 2 Lab	1	1	

Engineering Math for EE	1	3	
Electrical Systems Design	1	3	
Electrical Systems Design Lab	1	1	
Illumination Engineering Design	1	1	
Power Systems Analysis	1	3	
Power Systems Analysis Lab	1	1	
Fund of Power Plant Engg Design	1	1	
Dist Systems/Substation Design	1	3	
Dist Systems/Substation Design Lab	1	1	
Management of Engineering Projects	1	2	
Research Methods for EE	1	1	
Research Project	1	1	
Instrumentation and Control	1	2	
Instrumentation and Control Lab	1	1	
Feedback and Control Systems	1	2	
Seminars/Colloquia	1	1	
OJT	1	2	
Professional Elective 1	1	3	
Professional Elective 2	1	3	61
General Education/Mandated			
Science, Technology, and Society	1	3	
The Contemporary World	1	3	
Readings in Philippine History	1	3	
Understanding the Self	1	3	
Art Appreciation	1	3	
Purposive Communication	1	3	
Mathematics in the Modern World	1	3	
Ethics	1	3	
GEC Elective 1 (LITE)	1	3	
GEC Elective 2 (Great Books)	1	3	
GEC Elective 3 (GENSOC))	1	3	
Life. Works of Jose Rizal	1	3	
P.E. 1	1	2	
P.E. 2	1	2	
P.E. 3	1	2	
P.E. 4	1	2	
NSTP 1	1	3	
NSTP 2	1	3	50
Institutional Courses			
Lasallian Spirituality	1	3	
Christian Morality	1	3	
Spirituality in the Workplace	1	3	
Group Guidance 1	1	1.5	
Public Speaking	1	3	
Logic	1	3	
EE Review 1	1	1	
EE Review 2	1	1	
EE Review 3	1	1	
EE Review 4	1	1	20.5
	Total		**203.5**

MAJOR COURSE DESCRIPTION
Bachelor of Science in Electrical Engineering

EMA100 **3 units**
ALGEBRA AND TRIGONOMETRY
The course is designed to strengthen and increase the understanding of basic algebraic concepts of engineering students. Topics in algebra include algebraic, rational, exponential, and logarithmic functions and their graphs; systems of equations; linear, quadratic and higher degree polynomials; and word problems. Moreover, the course will also reinforce the trigonometry skills and concepts essential to success in calculus. Topics in trigonometry include trigonometric and inverse trigonometric functions and their graphs; proving identities; solving trigonometric equations; application of the law of the sines and cosines in simplifying trigonometric expressions; and conic sections.

As evidence of attaining the learning outcomes, the students are required to submit collaborative works on:
1. the use of algebraic concepts in solving real life applications.
2. the use of trigonometric concepts and principles in solving practical engineering problems.
3. the use of any mathematical software in solving systems of linear equations.

Prerequisite: None

EMA101 **4 units**
CALCULUS 1
Deals with the basic concepts of calculus such as limits, continuity and differentiability of functions; differentiation of algebraic and transcendental functions involving one or more variables; application of differential calculus to problems on optimization, rates of change, related rates, tangents and normal, and approximations; partial differentiation and transcendental curve tracing.

As evidence of attaining the learning outcomes, the students are required to submit collaborative works on:
1. exploring the use of any mathematical software in curve sketching,
2. locating the maximum and minimum value(s) of a function, and
3. identifying one (1) real world application of derivatives.

Prerequisite: Algebra and Trigonometry

EMA102 **4 units**
CALCULUS 2
Deals with the concept of integration and its application to physical problems such as evaluation of areas, volumes of revolution, force, and work; fundamental formulas and various techniques of integration applied to both single variable and multi-variable functions; tracing of functions of two variables.

As evidence of attaining the learning outcomes, the students are required to submit collaborative works on:
1. utilizing definite integration in finding the area of a plane region as well as the volume of a solid of revolution, and
2. utilizing integral to solve conceptual and real-world problems.

Prerequisite: Calculus 1

EMA103 **3 units**
DIFFERENTIAL EQUATIONS
Covers differentiation and integration in solving first order, first degree differential equations, and linear differential equations of order n; Laplace transforms in solving differential equations.

As evidence of attaining the learning outcomes, the students are required to submit collaborative works on:
1. exploring the use of any mathematical software in solving ordinary differential equations, and
2. identify practical engineering and scientific problems solved using differential equations.

Prerequisite: Calculus 2

EMA104 **3 units**
ENGINEERING DATA ANALYSIS
This course deals with basic principles of statistics; presentation and analysis of data; averages, median, mode; deviations; probability distributions; normal curves and applications; regression analysis and correlation; application to engineering problems.

At the end of this course, the student must be able to organize, analyze, and interpret large source of data; present an approved project that demonstrates the use of statistics.
Define relevant statistical terms; discuss competently the following concepts: Frequency distribution, Measures of central tendency, Probability distribution, Normal distribution, Inferential statistics; and apply accurately statistical knowledge in solving specific engineering problem situations.
Prerequisite: Calculus 1

EMA203 **3 units**
ENGINEERING MATH FOR EE
The course deals with the study of mathematical methods for solving engineering problems such as complex number, complex variables, Cauchy-Riemann equations, Laplace transformation and Laplace transform analysis, Fourier series and Fourier transform, z- transform, power series solutions of ordinary differential equations, partial differential equation, and hypergeometric equations such as Legendre and Bessel functions.

At the end of this course, the student must be able to pass a written comprehensive examination that covers application of Laplace transforms, Fourier series and Fourier transform, z-transform, power series solutions of ordinary differential equations, and partial differential equations.
Prerequisite: Differential Equations

EMA301 **3 units**
NUMERICAL METHODS (LEC/LAB)
This course covers the concepts of numerical analysis and computer software tools in dealing with engineering problems. It includes techniques in finding the roots of an equation, solving systems of linear and non-linearequations, eigenvalue problems, polynomial approximation and interpolation, ordinary and partial differential equations. The Monte-Carlo method, simulation, error propagation and analysis, the methods of least squares and goodness-of-fit tests are also covered.

At the end of this course, the student must be able to solve all problems in a take home examination which covers numerical methods of solving linear and nonlinear equations, system of linear and nonlinear equations, and solution to ordinary differential equations; submit a computer solution using MATLAB of a specific complex engineering problem.
Prerequisite: Engineering Math for EE

GE101 **1 unit**
ENGINEERING DRAWING
This course deals with practices and techniques of graphical communication, application of drafting instruments, lettering scale, and units of measure; descriptive geometry, orthographic projections; auxiliary views; pictorial drawings; requirements of engineering working drawings; and assembly exploded detailed drawings.

At the end of the course, the student must be able to prepare a comprehensive technical drawings that demonstrate knowledge and skills such as line work, use of scale, lettering, multi-view and sectional views drawings, drafting techniques, and proper use of drawing instruments,
Prerequisite: None

GE102 **3 units**
ENGINEERING MECHANICS
This course deals with Force, moment, and motion concepts. Newton's Laws of Motion. Analysis of particles and rigid bodies in static and dynamic equilibrium using vector mechanics and energy and momentum methods. Geometric properties of lines, areas, and volumes.

At the end of this course, the student must be able to model and analyze static equilibrium problems which focus on real world applications.
Prerequisites: Physics for Engineers

GE104 **2 units**
MATERIAL SCIENCE AND ENGINEERING
This course deals with the properties of engineering materials including mechanical, acoustical, electrical, magnetic, chemical, optical, and thermal properties.

At the end of this course, the student must be able to pass a written comprehensive examination that covers properties and characteristics of engineering materials, industrial usage of engineering materials, and the behavior of materials when subjected to different kinds of testing.
Prerequisite: Chemistry for Engineers, Fundamentals of Deformable Bodies

GE105 **3 units**
ENVIRONMENTAL SCIENCE AND ENGINEERING WITH GIS
This course deals with ecological framework of sustainable development; pollution environments: water, air, and solid; waste treatment processes, disposal, and , rules, and management; government legislation regulation related to the environment and waste management; and environmental management system.

At the end of this course, the student must be able to present a solution of a case study problem related to treatment schemes for waste disposal and effects of environmental pollution; use of existing laws, rules, and regulations of the government on environmental issues.
Prerequisite: None

GE106 **3 units**
ENGINEERING ECONOMICS
This course deals with the concepts of time value of money and equivalence; basic economy study methods; decisions under certainty; decisions recognizing risk, and decisions admitting uncertainty.

At the end of this course, the student must be able to present a detailed analysis of a case study problem which involve interest and time value of money, engineering economic methods of selecting the most economically efficient project, and basic economic decision making concepts involving risk and uncertainty in project outcomes; communicate effectively the results of the study in a written report.
Prerequisite: Engineering Data Analysis

GE108 **3 units**
TECHNOPRENEURSHIP
Covers a course on entrepreneurship with emphasis on the technology industry. Introduces specific issues and characteristics found in the technology like history of technology, technology organization, marketing technology, financing technology ventures, governmental and legal factors like patents and copyright and technology strategies. It also covers the value of professional and life skills in entrepreneurial thought, investment decisions, and actions that students can utilize in starting technology companies or executing R&D projects in companies.

At the end of this course, the student must be able to prepare a comprehensive business plan for a technology idea and develop it into a prototype.
Prerequisite: 4th year standing

GE113 **2 units**
FLUID MECHANICS
The course deals with the nature and physical properties of fluids as well as the identification and measurement of fluid properties. It emphasizes the application of conservation laws on mass, energy and momentum to fluid systems either incompressible or compressible flow, in viscid or viscous flows as well as head loss calculation on pipes and fittings.

At the end of this course, the student must be able to identify the different fluid properties and the methods of measuring them; apply the principles of conservation of mass, momentum and energy to fluid systems; explain the concept of dimensional analysis; apply the concept of Steady Incompressible Flow in Conduits.
Prerequisite: Physics for Engineers

GE201 **1 unit**
COMPUTER-AIDED DRAFTING
This course deals with the concepts of computer-aided drafting; introduction to the CAD environment; terminologies; and the general operating procedures and techniques in entering and executing basic CAD commands.

At the end of this course, the student must be able to define the terms related to computer-aided drafting systems; identify the important tools used to create technical drawings in CAD; create electronic drawing (e-drawing) using CAD; use computer as a tool for electrical system design and simulation.
Prerequisite: Engineering Drawing

GE202 **2 units**
FUNDAMENTALS OF DEFORMABLE BODIES
This course deals with the study of strength of materials where the understanding of how bodies and materials respond to applied loads is the main emphasis. The course covers the fundamental concepts of stresses and strains experienced and/or developed by different materials in their loaded state and subjected to different conditions of constraint that includes axial stress, shearing stress, bearing stress, torsion, flexural stress, and strss-strain relationships.

At the end of this course, the student must be able to pass a comprehensive examination that covers concepts on stress and strain, bending and shear stress, torsion under plain and combined loading, analyze statistically determinate and indeterminate structures, and elastic stability of columns.
Prerequisite: Engineering Mechanics

GE203 **2 units**
BASIC THERMODYNAMICS
This course deals with the thermodynamic properties of pure substances, ideal and real gases and the study and application of the laws of thermodynamics in the analysis of processes and cycles; introduction to vapor and gas cycles.

At the end of this course, the student must ba able to pass a comprehensive examination that covers utilization of energy in thermal systems, open and closed systems, and vapour and gas cycles.
Understand the principles underlying the utilization of energy in thermal systems, open and closed systems; and know the vapour and gas cycles.
Prerequisite: Physics for Engineers

GE204 **3 units**
BASIC OCCUPATIONAL SAFETY AND HEALTH
The course deals with key Occupational, Health and Safety (OSH) concepts, principles and practices that are foundational knowledge requirements acceptable in almost all industries; determination of existing and potential safety and health hazards; identification of control measures; provisions of Philippine laws that refer to occupational safety and health.

At the end of this course, the student must be able to discuss the health and safety concerns in an industrial setting and the importance of promoting safety and health as an engineer's professional and ethical responsibility; perform safety audit of any of the following: a process, equipment, or an industrial plant; apply the concepts and principles of industrial safety and health to case studies.
Prerequisite: None

GE205 **2 units**
MANAGEMENT OF ENGINEERING PROJECTS
The course covers the principles of management, theory and practice, various approaches to decision making, managing production and services operations; and project management. Emphasis is also given on the managerial functions of planning, organizing, staffing, leading and controlling.

At the end of this course, the student must be able to apply the basic principles of management in engineering projects.
Prerequisite: Engineering Economics

CHM101E **5 unis**
CHEMISTRY FOR ENGINEERS (LEC/LAB)
Deals with the basic concepts of matter and its classification; mass relationships in chemical reactions; properties of gases; liquids, and solids; concepts of thermochemistry; quantum theory and electronic behaviour; periodic relationship of elements in the periodic table; intramolecular forces; and solutions.

As evidence of attaining the learning outcomes, the students are required to submit collaborative works on:
1. identifying chemical processes that occurs in the environment and how these processes affect us,
2. give specific examples of the role of chemistry in energy generation, and
3. find one specific application of chemistry in their specific field of specialization

Prerequisite: None

PHY101E **5 units**
PHYSICS FOR ENGINEERS (LEC/LAB)
This course deals with vectors; kinematics; dynamics; work, energy, and power; impulse and momentum; rotation; dynamics of rotation; elasticity; and oscillation; fluids; thermal expansion, thermal stress; heat transfer; calorimetry; waves; electrostatics; electricity; magnetism; optics; image formation by plane and curved mirrors; and image formation by thin lenses.

As evidence of attaining the learning outcomes, the students are required to submit the following:
1. portfolio of seatworks, quizzes and problem sets, and
2. paper and oral presentation of assigned problem.

Co-requisite: Calculus 2

CFP101 **1 unit**
COMPUTER PROGRAMMING
This course deals with basic information technology concepts; fundamentals of algorithm development; high-level language and programming applications.

At the end of this course, the student must be able to submit a computer program that solve a specific electrical engineering problem using high-level programming language and applications.
Prerequisite: None

EE201 **5 units**
ELECTRICAL CIRCUITS 1 (LEC/LAB)
This course covers the basic concepts and fundamental laws of electrical circuit theory; analysis and applications of series, parallel and series-parallel resistive circuits. It also covers nodal and mesh analysis; application of network theorems in circuit analysis; analysis of circuits with controlled sources and ideal op-amps; fundamentals of capacitors and inductors; complete analysis of dc driven RL, RC, and RLC circuits; sinusoidal steady-state analysis of general RLC circuits.

At the end of this course, the student must be able to analyze, design and construct RL, RC, and RLC circuits for practical applications; perform laboratory experiments using proper instruments, analyze data and draw conclusions.
Prerequisite: Physics for Engineers' Calculus 2
Co-requisite: Electrical circuits 1 (Lab)

EE202 **5 units**
ELECTRICAL CIRCUITS 2 (LEC/LAB)
The course deals with sinusoidal steady-state analysis in the frequency domain; AC circuit power analysis; analysis of polyphase circuits and magnetically-coupled circuits; frequency response; per unit system and symmetrical components; and two-port networks.

At the end of this course, the student must be able to connect two single-phase wattmeter to measure the total power of both balanced and unbalanced three-phase circuit; analyze, design and construct power factor correction circuits for single-phase and three-phase systems.
Prerequisites: Electrical Circuits 1(Lec, Lab)
Co-requisite: Electrical Circuits 2 (Lab)

EE203 **3 units**
ELECTROMAGNETICS
The course deals with the study of electric and magnetic fields; resistive, dielectric and magnetic materials; coupled circuits, magnetic circuits and fields, and time-varying electromagnetic fields. It involves a review of vector analysis and types of coordinate system (Cartesian, cylindrical and spherical coordinate systems). Topics covered are dot and cross products of vector, Coulomb's law and electric field intensity of different charge configuration (volume, point, line sheet charge), electric flux density, Gauss's Law, divergence, Maxwell's equations and energy and potential.

At the end of this course, the student must be able to solve problems pertaining to electric field, electric flux density, potential, stored energy, and capacitance associated with simple distribution of charge; and problems about magnetic, stored energy, and inductance for simple current distribution.
Prerequisite: Physics for Engineers, Differential Equations

EE204 **4 units**
ELECTRONIC CIRCUITS, DEVICES, & ANALYSIS (LEC/LAB)
The course covers the fundamentals of electronics and electronic circuits with their basic applications. This includes diode and transistor characteristics necessary for elementary analysis of electronic circuits with discrete components. The second half of the course covers integrated circuits commonly used electrical engineering. The course introduces students to the design of electronic circuits for basic applications such as filters, power supplies and op amp signal processors.

At the end of this course, the student must be able to prepare a final project utilizing diodes, transistors, and integrated circuits with real-world applications; demonstrate the ability to use computers in electronic circuit design and simulation.
Prerequisite: Electrical circuits 1
Co-requisite: Electronic Circuits, Devices, and Analysis (Lab)

EE301 **3 units**
ELECTRICAL MACHINES 1 (LEC/LAB)
The course deals with the fundamentals of DC machinery; DC motors and generators.
At the end of this course, the student must be able to operate and test DC generators and DC motors to determine efficiency and voltage regulation; use Festo Didactic computer software for dc machine simulation exercises.

Apply theories and principles of operation of DC motors and DC generators.
Prerequisite: Electromagnetics, Electrical Circuits 2
Co-requisite: Electrical Machines 1 (Lab)

EE302 4 units
ELECTRICAL MACHINES 2 (LEC/LAB)
The course deals with the fundamentals of AC machinery; synchronous generators and motors; induction motors; single-phase and special-purpose motors,

At the end of this course, the student must be able to design and simulate AC motor controls; operate and test AC motors to determine their operating characteristics; use Festo Didactic computer software for ac machine simulation exercises.
Prerequisite: Electrical Machines 1

EE303 3 units
ELECTRICAL APPARATUS AND DEVICES (LEC/LAB)
This course provides characteristics, principle of operation, and applications of single-phase and three-phase transformers and protective devices such as fuses and circuit breakers. It includes various types of transformers based on different criteria, types of fuses and circuit breakers, parallel operation of transformers, and standard ratings.

At the end of this course, the student must be able to specify proper transformer ratings for a particular requirement; develop software tools for design calculations and parameter calculations of transformers; use Festo Didactic software for simulating transformer tests and operations.
Prerequisites: Electrical circuits 2
Co-requisite: Electrical Apparatus and Devices (Lab)

EE304 3 units
FUNDAMENTALS OF ELECTRONIC COMMUNICATION
This course deals with the fundamental principles of electronic communication theory and its applications. Emphasis is on the introduction of electronic communication systems, analysis and calculations of analog and digital modulation, transmission and reception. Provides insights, framework, knowledge and competencies necessary in analyzing basic communication system.

At the end of this course, the student must be able to use the concepts of bandwidth; filters; linear modulation; angle modulation; phase locked loop; pulse modulation; multiplexing techniques; noise analysis; radio transmitters and receivers in the analysis of telecommunication circuits.
Prerequisite: Electronic Circuits, Devices, and Analysis

EE305 3 units
LOGIC CIRCUITS AND SWITCHING THEORY (LEC/LAB)
This course provides a review of number systems, coding and Boolean algebra; inputs and outputs; gates and gating networks; combinational circuits; standard form; minimization; sequential circuits; state and machine equivalence; asynchronous sequential circuits; race conditions; algorithmic state machines; and design of digital sub-systems.

At the end of this course, the student must be able to submit a final design project using logic circuits and applying minimization techniques in the design process; solve real-world engineering problems applying the design and prototype.
Prerequisite: Electronic Circuits, Devices, and Analysis
Co-requisite: Logic Circuits and Switching Theory (Lab)

EE306 4 units
INDUSTRIAL ELECTRONICS (LEC/LAB)
This course teaches the theory and operation of solid-state devices and control circuits for industrial processes; industrial control applications; electronics instrumentation; transducers; data acquisition system, power supply and voltage regulator. It also covers photo electronics, sensors and instruments used in industrial applications. It includes variable frequency drives; DC motor; servomotors and stepper motor drives; application of relay logic circuits; nd interfacing and programming of PLCs.

At the end of this course, the student must able to create a prototype for the final project that demonstrate the application of control circuits, electronic instrumentation, transducers, data acquisition system, voltage regulator, and sensors for industrial applications.
Prerequisite: Electronic Circuits, Devices, & Analysis

EE307 2 units
MICROPROCESSOR SYSTEMS
The course includes history and evolution, principles, and applications of microprocessors. The focus is on the basic understanding of the architectural design, functional parts, operations, function and programming. It also covers the study of various types of microprocessors and the fundamental concepts of microcontrollers.

At the end of this course, the student must be able to design a microprocessor-based systems using the appropriate microprocessor for real-world applications; construct a system prototype based on the given specifications; develop a software for the given application. workstations, etc.); analyze the capabilities of different processors; program a specific microcontroller system to accept input, process data and control physical devices.
Prerequisite: Logic Circuits and Switching Theory

EE308 2 units
FEEDBACK AND CONTROL SYSTEMS
This course deals with the basics of control systems; terminologies and diagrams; homogeneous and transient responses of systems; systems representation such as transfer functions, state-space analysis of phase variables and techniques, nth order linear differential equations; modeling,

pole-zero gain data and frequency response data; Laplacetransforms; block diagrams interconnections and simplifications; signal flow graphs; conversion of block diagrams to signal flow graphs and vice versa; root locus; Bode, Nyquist and Polar plots; PID controllers; sensitivity and stability criteria; linear feedback systems; and compensation techniques.

At the end of this course, the student must be able to analyze and design mathematical models of electrical systems using the knowledge and skills acquired in higher mathematics and sciences.
Prerequisite: Engineering Math for EE; Electronic Circuits, Devices, and Analysis

EE309 **2 units**
EE Laws, Codes, and Professional Ethics
The course is designed to prepare electrical engineering students for professional practice. Topics include education and practice of the New Electrical Engineering Law and other laws governing the profession, Philippine Grid Code, Philippine Distribution Code, Basic Contracts and ethics in relation to thepractice of the electrical engineering profession.

At the end of this course, the student must be able to present case studies expressing electrical engineering laws, code and ethics; design electrical systems with ethical considerations.
Prerequisite: Ethics

EE310 **2 units**
ON-THE-JOB TRAINING
The course covers industry exposure of students for them to match school acquired competencies and knowledge with the realities and problems of industry. This may include involvement in industry manpower requirements, development and research concerns, training, and applications of principles, environmental concerns, ethical and behavioral concerns, decision-making, equipment and materials management.

At the end of this course, the student must be able to prepare a report about the actual and hands-on experiences learned from their on-the-job training which strengthened their knowledge learned from school; learn how to work harmoniously with superiors and coworkers in a company.
Prerequisite: 4th year standing

EE401 **4 units**
ELECTRICAL SYSTEMS DESIGN (LEC/LAB)
The course provides knowledge, understanding and skills in designing electrical wiring system for residential, commercial buildings, and industrial facilities through the specifications and standards mandated by the Philippine Electrical Code and provisions from the Local Government on electrical wiring installation.

At the end of this course, the student must be able to design electrical systems for residential, commercial, and industrial buildings based on the provisions of the Philippine Electrical Code and other relevant laws on environmental impact considerations.
Prerequisite: Electrical Machines 2
Co-requisite: Electrical Systems Design (Lab)

EE402 **1 unit**
ILLUMINATION ENGINEERING DESIGN
The course deals with illumination design and cost estimation; energy-efficient lighting systems for residential, commercial, and industrial establishments; roadway lighting, and lighting maintenance.

At the end of this course, the student must be able to submit a problem-based research investigation and design project involving lighting design concepts, lighting system integration, lamp and luminaire specifications, and illumination calculations.
Co-requisite: Electrical Systems Design

EE403 **4 units**
POWER SYSTEM ANALYSIS (LEC/LAB)
The course deals with the study on the basic structure of power systems, recent trends and innovations in power systems, transmission line parameters, network modeling and calculations, load flow studies, short circuit calculations and use of computer software for simulation.

At the end of this course, the student must be able to design a cost efficient power transmission system that will transport renewable energy from a local solar power facility to meet the needs of the consumers and the industry at the same time reducing the community's carbon footprint; show the ability to use computer software in system analysis, design and simulation.
Prerequisites: Electrical Machines 2, Electrical Apparatus and Devices
Co-requisite: Electrical Standards and Practices

EE404 **1 unit**
ELECTRICAL STANDARDS AND PRACTICES
This course provides the different electrical practices in accordance to local and international standards.

At the end of this course, the student must be able:
submit a report about safety measures and practices in a case study to avoid possible hazards caused by electricity; discuss the duties and responsibilities of building management in ensuring safety of electrical installation; apply statutory requirements on safety standards regarding electrical works, equipment and installations.
Prerequisite: EE Laws, Codes, and Professional Ethics

EE405 **1 unit**
RESEARCH METHODS FOR EE
This course covers the study of the methodologies used in conducting anengineering research. It includes the types and application of research, characteristics of a good research, research design, research instrument and data gathering procedures. It also deals with the study of writing a research proposal and various formats.

At the end of this course, the student must be able to submit a research proposal related to alternative energy sources, innovations in equipment design,

software development for electrical circuit and design, and other projects related to the practice of electrical engineering.
Prerequisite: Engineering Data Analysis

EE406 3 units
INSTRUMENTATION AND CONTROL (LEC/ LAB)
The course deals with the study on control and testing: electromechanical, analog and digital measuring and testing instruments; R, L and C measurements: calibration; graphic and waveform analyzing instruments; detectors for the measurements of process variables; analysis of performance characteristics of control systems; electronics, magnetic, hydraulic and mechanical control. It includes principles of controls and test measurements involving sensors, pneumatic controls, actuators, thermal detectors, thermocouples, thermistors, transducers, PID controllers.

At the end of this course, the student must be able to prepare a final design project with practical applications in the field of electrical engineering utilizing the various types of measuring and testing instruments.
Prerequisite: Feedback and Control Systems
Co-requisite: Instrumentation and Control (Lab)

EE407 4 units
DISTRIBUTION SYSTEMS AND SUBSTATION DESIGN (LEC/LAB)
The course deals with study and design of primary and secondary distribution networks, load characteristics, voltage regulation, metering techniques and systems, and protection of distribution systems.

At the end of this course the student must be able to design a distribution substation according to established technical standards and specifications, including location relevant to load, environmental and safety considerations; design an electric distribution systems applying Philippine, IEEE/ ANSI, and IEC standards and specifications.
Prerequisite: Power Systems Analysis
Co-requisite: Distribution Systems and Substation Design (Lab)

EE408 1 unit
FUNDAMENTALS OF POWER PLANT ENGINEERING DESIGN
The course covers topics on load graphics, types of power plants, power plant operation and protection, interconnections, economics of electric service, and arrangement of equipment for modern plants and includes the design of a power plant, its interconnection, operation, economics, and protection.

At the end of this course, the student must be able to submit a design of a power plant using wind, solar, and other alternative energy sources; specify the various types of electrical equipment, apparatus and devices used in power a power plant; give due considerations to environmental effect on the designs.
Prerequisite: Power System Analysis

EE409 1 unit
RESEARCH PROJECTS
The course covers thesis/research project on any of the following areas: alternative energy resources, innovative electrical equipment design, software development for power sytem analysis and design, software development for circuit analysis, software development for illumination design, transportation design using electricity, development of low-cost and sustainable eco materials for electrical installation, other projects related to the practice of electrical engineering profession.

At the end of this course, the student must be able to produce and successfully defend a thesis in the areas indicated.
Prerequisite: Research Methods

EE410 1 unit
SEMINARS/COLLOQUIA
The course involves the attendance and participation of EE graduating students in technical seminars/workshops related to the field of Electrical Engineering. Students are also required to attend non-technical seminars and training for the enhancement of their personality. It also involves short lectures on current trends and recent developments in the EE field. It may include educational visits to selected companies and manufacturing plants.

At the end of this course, the student must be able to create a technical presentation either oral or written with regards to new technologies, standards and regulations gained from seminars and from actual plant visits.
Prerequisite: 5th yr. standing

EELEC401 3 units
POWER SYSTEM PROTECTION 1
This course deals with the study on the protection of alternators and transformers connected to the electric system at various conditions. It also involves the study of relay operating principles and characteristics, types of protective relays, applications of protective relaying, and selection of protective relays for transmission and distribution substations/switchgears.

At the end of this course, the student must be able to design a basic protection system of a power transmission system; perform fault analysis and calculations; demonstrate relay coordination in transmission and distribution systems.
Prerequisite: Power System Analysis

EELEC402 3 units
POWER SYSTEMS PROTECTION 2
The course covers insulations in electric field, electrical discharges and insulation systems, calculation of transient voltages, overvoltage, overvoltage protection and insulation coordination, and testing and measuring techniques.

At the end of this course, the student must be able to submit a paper based project detailing the applications of various protection equipment and configuration.

EIA1E **1 unit**
ENGINEERING INTENSIVE APPRAISAL 1 FOR EE
This review course on mathematics covers the following subjects: algebra, trigonometry, analytic geometry, differential calculus, integral calculus, differential equations, complex numbers, probability and statistics, advance engineering mathematics including matrices, power series, Fourier analysis, Laplace transforms, and others.

At the end of this course, the student must be able to obtain a rating of at least 70% in the pre-board exam in Mathematics.
Prerequisite: 3rd year standing

EIA2E **1 unit**
ENGINEERING INTENSIVE APPRAISAL 2 FOR EE
This course is a review on engineering sciences and allied subjects, such as general chemistry, college physics, computer fundamentals and programming, engineering materials, engineering mechanics, fluid mechanics, strength of materials, thermodynamics, electrical engineering law, engineering economics, engineering management, contracts and specifications, code of professional ethics, Philippine Electrical Code, Parts 1 and 2 and others.

At the end of this course, the student must be able to obtain a rating of at least 70% in the pre-board exam in Engineering Sciences and Allied Subjects.
Prerequisite: 3rd year standing

EIA3E **1 unit**
ENGINEERING INTENSIVE APPRAISAL 3 FOR EE
This course is a review on electrical engineering professional subjects, such as: electrical circuits, electronic theory and circuits, energy conversion, electrical machines, electrical equipment, components and devices, control systems, principles of communication, and others.

At the end of this course, the student must be able to obtain a rating of at least 70% in the pre-board exam in Basic Electrical Engineering Courses.
Prerequisite: 4rd year standing

EIA4E **1 unit**
ENGINEERING INTENSIVE APPRAISAL 4 FOR EE
This course is a review on electrical engineering subjects, such as: power transmission and distribution, instrumentation and measurement, circuit and line protection, power plant, electronic power equipment, electrical systems, illumination, building wiring and others.

At the end of this course, the student must be able to obtain a rating of at least 70% in the pre-board exam in Professional Electrical Engineering Courses.
Prerequisite: 4rd year standing