UNIVERSITY OF ST. LA SALLE

Bachelor of Science in Electronics Engineering (BSECE)

Program Description

The Bachelor of Science in Electronics Engineering program integrates available and emerging technologies with knowledge of mathematics, natural, social and applied sciences to conceptualize, design, and implement new, improved,or innovative electronic, computer and communication systems, devices, goods, services and processes.

Program Educational Objectives

Within 3-5 years from graduation, the Electronics Engineering graduates are expected to:

1. be employed and practice as a licensed Electronics Engineer in a well-established company, and be prepared to pursue a career and graduate school opportunities.
2. contribute in research and development projects or partake in innovating solutions to current issues.
3. uphold and foster the Christian Filipino cultural values and heritage in the practice of profession.

Program Outcomes

At the end of the degree program, students are expected to be able to:

a. Apply principles of mathematics and science to solve engineering problems using technology and innovative methods
b. Conceptualize, formulate and implement experiments as well as analyze and interpret data in a standard scientific manner with consideration of cost, quality, security and environmental impact
c. Design an overall system to meet specified needs in electronics engineering with consideration for social, political, economic, environmental, health and safety and ethical standards
d. Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings
e. identify, formulate and apply principles of mathematics and science to solve complex engineering problems with an understanding on limitations
f. Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice
g. Communicate, collaborate effectively and participate as a member or a leader in a multidisciplinary environment
h. Innovate creative solutions which is responsive to both local, national and global trends with consideration for the environment
i. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change guided by self-reflection and self-evaluation
j. Make a personal commitment to societal, health, safety, legal and cultural issues recognizing obligations to society, subordinates and environment in conjunction with the Electronics Engineering Professional Practice
k. Use techniques, skills, and modern engineering tools necessary for Electronics engineering practice

l. Apply knowledge 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 and in multidisciplinary environments
m. Specialize in at least one field of Electronics Engineering discipline and apply learnings to provide sustainable and technically-sound solutions to present and emerging problems

Admission Policies

1. Students seeking admission to the program must have a GPA of at least 85%.
2. Students admitted on probation must comply with the terms and conditions set by the University.

Retention Policy (In addition to the University's standard retention policy)

A student will be dismissed from the ECE program due to any of the following reasons if
1. he/she incurs a total of 18 units failure or.
2. he/she incurs a total of 12 units in one semester.

UNIVERSITY OF ST. LA SALLE

BACHELOR OF SCIENCE
Electronics Engineering

FIRST YEAR

First Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
EMA101	Calculus 1	4	4	0	4	NONE	EMA 100
EMA100	Algebra and Trigonometry	3	2	3	5	NONE	
CHM101E	Chemistry for Engineers(Lec)	4	4	0	4	NONE	
CHM101EL	Chemistry for Engineers(Lab)	1	0	3	3		CHM101E
GE101	Engineering Drawing	1	0	3	3	NONE	
IGG	GG1	1.5	1.5	0	1.5	NONE	
MATHMW	Mathematics in the Modern World	3	3	0	3	NONE	
NSTP1	NSTP 1	3	3	0	3	NONE	
PED1	Physical Education 1 (Wellness and Fitness)	2	2	0	2	NONE	
EECE101	Practical Electronics	1	0	3	3	NONE	
PCOM	Purposive Communication	3	3	0	3	NONE	
IRS1	Lasallian Spirituality	3	3	0	3	NONE	
	Total	**29.5**	**25.5**	**12**	**37.5**		

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	
USELF	Understanding the Self	3	3	0	3	NONE	
EMA104	Engineering Data Analysis	3	3	0	3	EMA101	
NSTP2	NSTP 2	3	3	0	3	NSTP1	
IRS2	Christian Morality	3	3	0	3	IRS1	
PED2	Physical Education 2 (Team Sports and Rhythmic Activities)	2	2	0	2	PED1	
PHY101E	Physics for Eng ineers (Lec)	4	4	0	4	EMA101	EMA102
PHY101EL	Physics for Engineers (Lab)	1	0	3	3		PHY101E
GE201	Computer Aided Drafting	1	0	3	3	GE101	
PHY102E	Physics 2 (Lec)	3	3	0	3	EMA101	PHY101E
PHY102EL	Physics 2 (Lab)	1	0	3	3		PHY102E
	Total	**28**	**25**	**9**	**34**		

SECOND YEAR

First Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
EECE201	Circuits 1(Lec)	3	3	0	3	EMA102 PHY102E	
EECE201L	Circuits 1 (Lab)	1	0	3	3		EECE201
EMA103	Differential Equation	3	3	0	3	EMA102	
IRS3	Spirituality in the Workplace	3	3	0	3	IRS1	
LOGIC	Logic	3	3	0	3	NONE	
EECE102	Electronic Devices and Circuits (Lec)	3	3	0	3	EMA102 PHY102E	
EECE102L	Electronic Devices and Circuits (Lab)	1	0	3	3		EECE102
GE106	Engineering Economics	3	3	0	3	EMA104	
PED3	Physical Education 3 (Swimming and Recreation)	2	2	0	2	PED1	
PSPEAK	Public Speaking	3	3	0	3	NONE	
CFP101A	Computer Programming	2	0	6	6	NONE	
	Total	**27**	**23**	**12**	**35**		

Second Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
EECE103	Advanced Engineering Mathematics for ECE (Lec)	3	3	0	3	EMA103	
EECE103L	Advanced Engineering Mathematics for ECE (Lab)	1	0	3	3		EECE103
EECE202	Circuits 2 (Lec)	3	3	0	3	EECE201	
EECE202L	Circuits 2 (Lab)	1	0	3	3		EECE202
EECE104	Principles of Communication Design (Lec)	3	3	0	3	EECE102	
EECE104L	Principles of Communication Design (Lab)	1	0	3	3		EECE104
EECE203	Electromagnetics	4	4	0	4	EMA103	
EECE105	Electronic Circuit Analysis and Design (Lec)	3	3	0	3	EECE102	
EECE105L	Electronic Circuit Analysis and Design (Lab)	1	0	3	3		EECE105
GE104	Material Science and Engineering	3	3	0	3	CHM101E	
PED4	Physical Education 4 (Individual and Dual Sports)	2	2	0	2	PED1	
	Total	**25**	**21**	**12**	**33**		

THIRD YEAR

First Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
EECE106	Modulation and Coding Techniques (Lec)	3	3	0	3	EECE104	
EECE106L	Modulation and Coding Techniques (Lab)	1	0	3	3		EECE106
EECE107	Logic Circuits and Switching Theory (Lec)	3	3	0	3	EECE102	
EECE107L	Logic Circuits and Switching Theory (Lab)	1	0	3	3		EECE107
EECE108	Electronic Systems and Design (Lec)	3	3	0	3	EECE102	
EECE108L	Electronic Systems and Design (Lab)	1	0	3	3		EECE108
ETHICS	Ethics	3	3	0	3	NONE	
LITE	Living in the IT Era	3	3	0	3	NONE	
GE107	Engineering Management	3	3	0	3	NONE	
EECE109	Signals, Spectra, Signal Processing (Lec)	3	3	0	3	EECE103	EECE109
EECE109L	Signals, Spectra, Signal Processing (Lab)	1	0	3	3		EMA104
EECE110	Methods of Research	3	3	0	3	PCOM	
	Total	**28**	**24**	**12**	**36**		

Second Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
EECE111	Transmission Media and Antenna System & Design (Lec)	3	3	0	3	EECE106	
EECE111L	Transmission Media and Antenna System & Design (Lab)	1	0	3	3		
EECE112	Data Communications (Lec)	3	3	0	3	EECE106	EECE111
EECE112L	Data Communications (Lab)	1	0	3	3		
EECE113	Microprocess, Microcontroller Systems and Design (Lec)	3	3	0	3	EECE107	EECE112
EECE113L	Microprocess, Microcontroller Systems and Design (Lab)	1	0	3	3		
EECE114	Feedback and Control Systems (Lec)	3	3	0	3	EECE103	EECE113
EECE114L	Feedback and Control Systems (Lab)	1	0	3	3		
GenSoc	Gender and Society	3	3	0	3	NONE	EECE114
GBOOKS	Great Books	3	3	0	3	NONE	
GE108	Technoprenuership 101	3	3	0	3		
	Total	**25**	**21**	**12**	**33**		

Summer		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
EECE115	On-the-Job Training	3			3	4TH YR STANDING	
	Total	**3**			**3**		

FOURTH YEAR

First Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
ARTAP	Art Appreciation	3	3	0	3	NONE	
EIA1EC	Engg Intensive Appraisal 1 for ECE	1	0	3	3	EMA100, EMA101, EMA102, EMA103, EMA104	
EECE116	Computer Systems Architecture (Lec)	3	3	0	3	EECE113	
EECE116L	Computer Systems Architecture (Lab)	1	0	3	3		
RIZAL	Life and Works of Rizal	3	3	0	3	NONE	EECE116
EIA2EC	Engg Intensive Appraisal 2 for ECE	1	0	3	3	CHM101, PHY101, PHY102, GE106, EECE103	
STS	Science, Technology and Society	3	3	0	3	NONE	
EECE121	ECE Laws, Contract, Ethics, Standards & Safety	3	3	0	3	4TH YR STANDING	
EECE117	Design 1/Capstone Project 1	1	0	3	3	EECE112, EECE113, EECE108. GE106	
	Total	**19**	**15**	**12**	**27**		

Second Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
EIA3EC	Engg Intensive Appraisal 3 for ECE	1	0	3	3	EECE 101, EECE 102, EECE105, EECE107, EECE108, EECE113, EECE114, EECE201, EECE202	
EECE119	Operating Systems and Advanced Programming Languages (Lec)	3	3	0	3	EECE116	
EECE119L	Operating Systems and Advanced Programming Languages (Lab)	1	0	3	3		
RHIST	Readings in Philippine History	3	3	0	3	NONE	EECE119
EECE120	Seminars/Colloquium	1	0	3	3	4th yr Standing	
CWRLD	The Contemporary World	3	3	0	3	NONE	
GE105	Environmental Science and Eng›g	3	3	0	3	CHM101E	
EIA4EC	Engg Intensive Appraisal 4 for ECE	1	0	3	3	EECE104, EECE106, EECE109, EECE111, EECE112, EECE121	
EECE118	Design 2/Capstone Project 2	1	0	3	3	EECE117	
	Total	**17**	**12**	**15**	**27**		

UNIVERSITY OF ST. LA SALLE

SUMMARY OF REQUIRED COURSES
BS Electronics Engineering

	No. of Courses Required	Unit Equivalent	Total Units
Technical Course			
Mathematics			
Calculus 1 – 2	2	8	
Algebra and Trigonometry	1	3	
Differential Equation	1	3	
Engineering Data Analysis	1	3	17
Natural/Physical			
Chemistry for Engineers	2	5	
Physics for Engineers	2	5	10
Basic Engineering Sciences			
Computer-Aided Drafting	1	1	
Engineering Drawing	1	1	
Engineering Economics	1	3	
Engineering Management	1	2	
Technopreneurship 101	1	3	10
Allied			
Physics 2	2	4	
Materials Science and Engineering	1	3	
Computer Programming	1	2	
Circuits 1	2	4	
Circuits 2	2	4	
Environmental Science and Engineering	1	3	20
Professional			
Advanced Engineering Mathematics for ECE	2	4	
Electromagnetics	1	4	
Practical Electronics	1	3	
ECE Laws, Contracts, Ethics, Standards and	1	3	
Safety	1	3	
Electronics 1	2	4	
Electronics 2	2	4	
Electronics 3	2	4	
Signals, Spectra, Signal Processing	2	4	
Communications 1	2	4	
Communications 2	2	4	
Communications 3	2	4	
Communications 4	2	4	
Digital Electronics 1	2	4	
Digital Electronics 2	2	4	
Feedback and Control Systems	2	4	
Methods of Research	1	3	
Seminars/Colloquium	1	1	
On the Job Training	1	1	
Engineering Intensive Appraisal 1 for ECE	1	1	
Engineering Intensive Appraisal 2 for ECE	1	1	
Engineering Intensive Appraisal 3 for ECE	1	1	
Engineering Intensive Appraisal 4 for ECE	1	1	
Design 1/Capstone Project 1	1	1	
Design 2/Capstone Project 2	1	1	
Computer Systems Architecture	2	4	
Operating Systems and Advanced Programming Languages	2	4	77

Non–Technical Courses			
General Education			
Art Appreciation	1	3	
Ethics	1	3	
Mathematics for Modern World	1	3	
Purposive Communication	1	3	
Readings in Philippine History	1	3	
Science, Technology and Society	1	3	
The Contemporary World	1	3	
Understanding the Self	1	3	24
General Education Course Electives/Mandated			
Living in the IT Era	1	3	
Gender and Society	1	3	
Great Books	1	3	
Life and Works of Rizal	1	3	
Gender and Society	1	3	15
Physical Education 1 – 4	4	8	8
National Service Training Program			
National Service Training Program 1 – 2	2	6	6
Institutional			
Group Guidance	1	1.5	
Logic	1	3	
Public Speaking	1	3	
Religion Studies	3	9	
	87		16.5
Total			**200.5**

MAJOR COURSE DESCRIPTION
Electronics 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
An introductory course covering the core concepts of limit, continuity and differentiability of functions involving one or more variables. This also includes the application of differential calculations in solving problems on optimization, rates of change, related rates, tangents and normal, and approximations; partial differentiation and transcendental curve tracing.

At the end of this course, the student must be able to submit collaborative works on exploring the use of any mathematical software in curve sketching, locating the maximum and minimum value(s) of a function, and identifying one (1) real world application of derivatives.
Prerequisite: None

EMA102 **4 units**
CALCULUS 2
The course introduces the concepts of integration and its application to some physical problems such as evaluation of areas, volumes of revolution, force, and work. The fundamental formulas and various techniques of integration are taken up and applied to both single variable and multi-variable functions. The course also includes tracing of functions of two variables for a better appreciation of the interpretation of the double and triple integral as volume of a three-dimensional region bounded by two or more surfaces.

At the end of this course, the student must be able to submit collaborative works on utilizing definite integration in finding the area of a plane region as well as the volume of a solid of revolution, and utilizing integral to solve conceptual and real-world problems.
Prerequisite: EMA101- Differential Calculus

EMA103 **3 units**
DIFFERENTIAL EQUATIONS
This course is intended for all engineering students to have a firm foundation on differential equations in preparation for their degree-specific advanced mathematics courses. It covers first order differential equations, nth order linear differential equations and systems of first order linear differential equations. It also introduces the concept of Laplace Transforms in solving differential equations.

The students are expected to be able to recognize different kinds of differential equations, determine the existence and uniqueness of solution, select the appropriate methods of solution and interpret the obtained solution. Students are also expected to relate differential equations to various practical engineering scientific problems as well as employ computer technology in solving and verifying solutions. At the end of this course, the student must be able to submit collaborative works on exploring the use of any mathematical software in solving ordinary differential equations, and identify practical engineering and scientific problems solved using differential equations.
Prerequisite: EMA102- Calculus 2

EMA104 **3 units**
ENGINEERING DATA ANALYSIS
This course is designed for undergraduate engineering students with emphasis on problem solving related to societal issues that engineers and scientists are called upon to solve. It introduces different methods of data collection and the suitability of using a particular method for a given situation. The relationship of probability to statistics is also discussed, providing students with the tools they need to understand how " chance" plays a role in statistical analysis. Probability distributions of random variables and their uses are also considered, along with the discussion of linear functions of random variables with the context of their application to data analysis and inference. The course also includes estimation techniques for unknown parameters; and hypothesis testing used in making inferences from sample to population; inference for regression parameters and build models for estimating means and predicting future values of key variables under study. Finally, statistically based experimental design techniques and analysis of outcomes of experiments are discussed with the aid of statistical software.

At the end of this course, the student must be able to: Apply statistical methods in the analysis of data.
Prerequisite: EMA101- Differential Calculus

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

At the end of this course, the student must be able to prepare technical drawings by applying the basic concepts learned to the various areas of engineering.
Prerequisite: None

GE104 **3 units**
MATERIAL SCIENCE AND ENGINEERING
This course introduces the students to a broad study on the structure and composition of materials (metals, polymers, ceramics and composite materials) and their properties and behavior in service environments.

At the end of this course, the student must be able to select the appropriate material(s) for a given application.
Pre-requisite: CHM101E

GE105 **3 units**
ENVIRONMENTAL SCIENCE AND ENG'G
This course is about environmental science knowledge in ecology and human population control, variety of resources and outline plans for attaining sustainable society,, the enigma of pollution and the legal, technical and personal solution for it. It also involves a study of environmental impact assessment and environmental crisis.

At the end of this course, the student must be able to understand the engineer's role in the manipulation of materials and resources; have a high level of awareness in the environment and its significance; and understand the effect of design and creation of productive and efficient safety measures to be implemented in the workplace and all manufactured products.
Pre-requisite: CHM101E-Chemistry for Engineers

GE106 **3 units**
ENGINEERING ECONOMICS
This course involves the analysis and evaluation of factors for the economic success of engineering projects to ensure the best of capital.

At the end of this course, the student must be able to submit a case study applying the various principles of engineering economy to various engineering problems; prepare a depreciation and recovery plan for engineering projects; compare engineering projects based on economic factors and recommend the best use of capital for engineering projects based on the evaluation of economic factors.
Prerequisite: EMA103-Engineering Data Analysis

GE107 **2 units**
ENGINEERING MANAGEMENT
This course will entail students to learn the basic function of a manager applicable in decision making which are applicable to the real world problems. Furthermore, students would learn how to apply planning, leading, organizing and control principles into the resources in order to increase the efficiency.

At the end of this course, the student must be able to: Know the basic functions of management; describe the cultural setting within which managers make decision and the moral framework of their management philosophies; describe the basic functions of a manager; learn the stages of strategic planning and to know the hierarchy of plans and competitive strategies; describe and apply in case studies the elements and different types of leadership; describe the structure of formal organization; and describe the basic principles of controlling and the essential elements of the control system.
Prerequisite: none

GE108 **3 units**
TECHNOPRENEURSHIP 101
This course is a philosophy, a way of building a career or perspective in life. The course covers the value of professional and life skills in entrepreneurial thought, investment decisions, and action that students can utilize in starting technology companies or executing R & D projects in companies as they start their careers. The net result is a positive outlook towards wealth creation, high value adding, and wellness in society.

At the end of this course, the student must be able to: Prepare a business plan for a technology idea; and develop an initial idea into a "prototype".
Prerequisite: None

GE201 **1 unit**
COMPUTER-AIDED DESIGN
This course covers the concepts of computer-aided drafting with introduction on CAD terminologies and environment with the application of techniques in inputting and executing CAD commands.

At the end of this course, the student must be able to define the terms related to computer-aided drafting; identify the important tools used to create technical drawings in CAD; and create electronic drawings using the CAD software.
Pre-requisite: GE101-Engineering Drawing

CFP101A **2 units**
COMPUTER PROGRAMMING (OBJECT ORIENTED PROGRAMMING)
This laboratory course introduces the fundamental concepts of programming from an object oriented perspective. Topics are drawn from classes and objects, abstraction, encapsulation, data types, calling methods and passing parameters, decisions, loops, arrays and collections, documentation, testing and debugging, exceptions, design issues, inheritance, and polymorphic variables and methods. The course emphasizes modern software engineering and design principles.

At the end of this course, the student must be able to familiarize with fundamentals of Programming languages; apply programming concepts in engineering problems; and create graphic user interfaces in application to engineering problems,
Pre-requisite: None

CHM101E **4 units**
CHEMISTRY FOR ENGINEERS
This course provides students with core concepts of chemistry that are important in the practice of engineering profession.

At the end of this course, the student must be able to submit collaborative works on identifying chemical processes that occurs in the environment and how these processes affect us, give specific examples of the role of chemistry in energy generation, and find one specific application of chemistry in their specific field of specialization
Prerequisite:None

CHM101EL **1 unit**
CHEMISTRY FOR ENGINEERS LABORATORY
A fundamental laboratory course designed to relate and apply the principles and theories in chemistry to engineering practices. It is a combination of experimental and calculation laboratory.

At the end of this course, the student must be able to explicitly state experimental observation in relation to specific principles and fundamental concepts of chemistry, interpret results clearly obtained from the experiments, answer questions related to the performed experiment, develop critical and technical communication skills, explain the mechanics of alpha, beta and gamma decay as well as the correlation between half-lives, understand the natural environment and its relationships with human activities, and design and evaluate strategies, technologies, and methods for sustainable management of environmental systems and for the remediation or restoration of degraded environments.
Co-requisite: CHM101E- Chemistry for Engineers
Pre-requisite: None

PHY101E **4 units**
PHYSICS FOR ENGINEERS
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 predict the outcomes of some actions or events, explain effectively why a certain phenomena occur, or how certain local and industrial issues are better addressed without compromising the environment and the welfare of the community. The activity will enhance the critical thinking skills of the students as well as improve both their written and oral communication skills since their output will be submitted and presented in class.
Co-requisite: EMA102- Calculus 2
Pre-requisite: EMA101- Calculus 1

PHY101EL **1 unit**
PHYSICS FOR ENGINEERS LABORATORY
A 1-unit laboratory course in Physics that covers experiments on 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. It aims to provide students with strong understanding of the underlying principles and develop their critical thinking capabilitites.

At the end of this course, the student must be able to perform experiments in Physics and write reports about the activity. State experimental observation, interpret results clearly obtained from the experiments, and answer questions related to the performed experiment.
Co-requisite: PHY101E- Physics for Engineers

PHY102E **3 units**
PHYSICS 2
This course deals with thermodynamics (1st and 2nd law, basic concepts on heat engine and refrigerators), energy conversion (EM induction, magnetic flux, generators), semiconductor physics.

At the end of this course, the student must be able to use calculus to solve problems in thermodynamics; describe the three methods of heat transfer; solve basic problems in heat transfer; describe electromagnetism and apply its principles to problems on magnetic field and torque; define electric current, resistance and voltage; solve problems on inductance, reactance, impedance, RLC, resonance; solve problems on resistance and capacitances in series and parallel; state Kirchhoff's rules and apply them in a given circuit; describe concepts on nuclear physics; and describe formation of semiconductors, superconductors and crystals.
Co-requisite: PHY101E-Physics for Engineers
Pre-requisite: EMA101E- Calculus 1

PHY102EL **1 unit**
PHYSICS 2 LABORATORY
A laboratory course that covers experiments on first and second law on thermodynamics, heat engine and refrigerators, experiments on electricity such as resistors and capacitors in series and parallel, RL and RC circuits, reactance, impedance, resonance and experiments on semiconductor diodes.

At the end of this course, the student must be able to perform experiments in Physics and write reports about the activity. State experimental observation, interpret results clearly obtained from the experiments, and answer questions related to the performed experiment.
Co-requisite: PHY102- Physics 2 Lecture

EECE101 **3 units**
PRACTICAL ELECTRONICS
This course includes basic concepts and practical applications of discrete passive and active electronic devices and their formation as a system to form a useful tool in industries; practical troubleshooting of electronic system is also included. It also gives the student practical hands-on activities on the usage of the fundamental measuring instruments and in assembling a regulated power supply.

At the end of the course the student is required to construct a regulated power supply using the basic knowledge acquired from the discussion on different passive and active electronic elements such as capacitors, inductors, transistors, resistors etc.
Pre-requisite: None

EECE102 **3 units**
ELECTRONIC DEVICES AND CIRCUITS
This course deals with the introduction to quantum mechanics of solid state electronics; diode and transistor characteristics and models (BJT and FET); diode circuit analysis and applications; transistor biasing; small signal analysis; large signal analysis; transistor amplifiers; Boolean logic; transistor switch.

At the end of this semester, the student must be able to design a single stage amplifier using a BJT or FET with a specified output. Submit also a simulated output of the design using MultiSim or any computer-related application software.
Pre-requisite: PHY102, EMA102

EECE102L **1 unit**
ELECTRONIC DEVICES AND CIRCUITS LABORATORY
A laboratory course that covers experiments on solid state diode familiarization, diode applications, power supply, transistor familiarization and applications and other related topics.

At the end of the course, the students are expected to construct a single stage amplifier using a BJT or FET with a specified output. Submit also a simulated output of the design using MultiSim or any computer-related application software.

EECE201 **3 units**
CIRCUITS 1
This course deals with the fundamental relationships in circuit theory, mesh and node equations; resistive networks, network theorems; solutions of network problems using laplace transform; transient analysis; and methods of circuit analysis.

At the end of this course, the students are able to make a group circuit design utilizing the different DC circuit laws and principles for a simple Christmas lighting system.
Pre-requisite: PHY102E-Physics 2, EMA102

EECE201L **1 unit**
CIRCUITS 1 LABORATORY
A laboratory course that covers experiments on familiarization with DC equipment, series and parallel connection of linear resistors, delta to wye transformation of resistive networks; dc power measurement, Kirchhoff's Law, superposition law, thevenin's theorem, bridge circuit, RC/RL time constant curve and maximum power transfer.

At the end of this course, the student must be able to: Implement a group circuit design project utilizing the different DC circuit laws and principles.
Co-requisite: EECE201- Circuits 1

EECE202 **3 units**
CIRCUITS 2
This course deals with complex algebra and phasors; simple AC ciruits, impedance and admittance; mesh and node analysis for AC circuits; AC network theorems; power in AC circuits; resonance; three-phase circuits; transformers; two-port network parameters and transfer function.

At the end of this course, the students are able to make a group circuit design for a basic residential house lighting system.
Pre-requisite: EECE201-Circuits 1

EECE202L **1 unit**
CIRCUITS 2 LABORATORY
A laboratory course that covers experiments on familiarization with AC equipment, impedance of RC and RLC circuits; power dissipation in AC circuits; measurement of power factor, three-phase circuit, power in three-phase balanced load,transformer, frequency response of RL and RC and maximum power transfer.

At the end of this course, the students must be able to implement a group circuit design project utilizing the different AC circuit laws and principles.
Co-requisite: EECE102- Electronic Circuits and Devices

EECE103 **3 units**
ADVANCED ENGINEERING MATHEMATICS FOR ECE
This course is a study of selected topics in mathematics and their applications in advanced courses in engineering and other allied sciences. It covers the study complex number and complex variables, Laplace and inverse Laplace transforms, power series, fourier series, fourier transforms, z-transforms, power series solution of ordinary differential equations, partial differential equations and numerical methods in engineering.

At the end of this course, the student must be able to prepare algorithms, write computer programs, use computer software and implement these to the solution of engineering problems.
Pre-requisite: EMA103-Differential Equation

EECE103L 1 unit
ADVANCED MATHEMATICS FOR ECE LABORATORY
A computer laboratory course that covers experiments and exercises based on the topics covered in the lecture using available software such as Matlab, Mathematica, Mathcad or its equivalent.

At the end of this course, the student must be able to prepare algorithms, write computer programs, use computer software and implement these to the solution of engineering problems.
Co-requisite: EECE103- Advanced Mathematics for ECE

EECE104 3 units
PRINCIPLES OF COMMUNICATION SYSTEMS (LECTURE)
This course deals with bandwidth; filters; linear modulation; angle modulation; phase locked loop; pulse modulation; multiplexing techniques; noise analysis; radio transmitters and receivers.
At the end of this course, the student is required to submit any design for an analog communication system.
Prerequisite: EECE102
Co-requisite: EECE105- Electronic Circuit Analysis and Design

EECE104 L 1 unit
PRINCIPLES OF COMMUNICATION SYSTEMS (LABORATORY)
A laboratory course that covers experiments on Passive and Active Filters and tuned circuits; AM transmitter, Frequency modulation, Pulse amplitude modulation, diode detection, time division multiplexing and frequency division multiplexing.

At the end of this course, the student must be able to make an analog radio transmitter and receiver.
Co-requisite: EECE104- Principles of Communication Systems

EECE105 3 units
ELECTRONIC CIRCUIT ANALYSIS AND DESIGN (LECTURE)
This course deals with high frequency transistor models; analysis of transistor circuits; multi-stage amplifier; feedback, differential amplifiers and operational amplifiers; integrated circuit families (RTL, DTL, TTL, ECL, MOS).

At the end of this course, the student must be able to design a multistage amplifier using a BJT or FET with a specified output.
Pre-requisite:EECE102

EECE105L 1 unit
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN (LABORATORY)
A laboratory course that covers experiments on frequency response of a transistor amplifier; cascaded transistor amplifier; the differential amplifier; the transistor as a switch; familiarization with digital circuits; and filters.

At the end of this course, the student must be able to construct a multistage amplifier using a BJT or FET with a specified output.
Co-requisite: EECE105- Electronics 2

EECE106 3 units
MODULATION AND CODING TECHNIQUES (LECTURE)
This course deals with random variables, bit error rate; matched filter; digital modulation techniques; ASK, FSK, QAM, PSK/QPSK, CDMA, and W-CDMA systems; signal space; generalized orthonormal signals; information measures-entropy; channel capacity; efficient encoding; error correcting codes information theory; data compression; coding theory.

At the end of this course, the student must be able to: conceptualize, analyze and design an application of modulation and coding techniques.
Pre-requisite: EECE104- Communications 1

EECE106 L 1 unit
MODULATION AND CODING TECHNIQUES (LABORATORY)
A laboratory course that covers experiments on PAM, noise, FSK, ASK, PSK, PCM, error detection and correction

At the end of this course, the student must be able to conceptualize, analyze and design an application of modulation and coding techniques.
Co-requisite: EECE106- Communications 2

EECE107 3 units
LOGIC CIRCUITS AND SWITCHING THEORY DESIGN (LECTURE)
This course deals with a review of number systems, coding and Boolean algebra; inputs and outputs; gates and gating networks; combinational circuits; standard forms; minimization; sequential circuits; state and machine equivalence; asynchronous sequential circuits; race conditions; algorithmic state machines; design of digital subsystems

At the end of this course, the student must be able to submit a group design project of combinational logic circuit using universal gates, mux or decoders, or on sequential circuits such as counter applications: stop watch, count up/down timers, digital clocks or traffic lights.
Pre-requisite: EECE102- Electronics 1

EECE107 L 1 unit
LOGIC CIRCUITS AND SWITCHING THEORY DESIGN (LABORATORY)
A laboratory course that covers experiments on diode, transistor and integrated digital logic gates; flip flops; registers; counters (binary, ripple, decade, etc).

At the end of this course, the student must be able to construct a combinational logic circuit using universal gates, mux or decoders, or on sequential circuits such as counter applications: stop watch, count up/down timers, digital clocks or traffic lights.
Co-requisite: EECE107- Digital Electronics 1

EECE108 3 units
ELECTRONIC SYSTEMS AND DESIGN (LECTURE)
This course deals with the theory, operating characteristics and design of electronic devices and control circuits for industrial processes; industrial control applications; electronics instrumentation; transducers; data acquisition system; interfacing techniques; and sensors.

At the end of this course, the student must be able to submit a group design project on any application of SCADA related to the course such as communication networks, industrial plans and process control, or manufacturing.
Pre-requisite: EECE105- Electronics 2

EECE108L 1 unit
ELECTRONIC SYSTEMS AND DESIGN (LABORATORY)
A laboratory course that covers experiments on SCRs, UJT, PUT; TRIAC, DIAC and other thyristors; optoelectronic devices and sensors; transducers; interfacing techniques; and programmable logic controllers.

At the end of this course, the student must be able to submit a group design project on any application of SCADA related to the course such as communication networks, industrial plans and process control, or manufacturing.
Co-requisite: EECE108- Electronics 3

EECE109 3 units
SIGNALS SPECTRA AND SIGNAL PROCESSING (LECTURE)
This course deals with fourier transform; z-transform; convolution; FIR filters; IIR filters; random signal analysis; applications of signal processing to speech, image, etc.

At the end of this course, the student is required to submit any design of filters covered in the abovementioned topics.
Pre-requisite: EECE103- Advanced Engineering Mathematics for ECE

EECE109 L 1 unit
SIGNALS SPECTRA AND SIGNAL PROCESSING (LABORATORY)
A laboratory course that covers experiments on periodic and non-periodic signals; computation of transforms; sampling and quantization; measurements on filter response; FIR filter and IIR filter analysis and design.

At the end of this course, the student must be able to submit any design of filters covered in the abovementioned topics.
Co-requisite: EECE109- Signals Spectra and Signal Processing

EECE110 3 units
METHODS OF RESEARCH (LECTURE)
This course deals with research preparation methods, research tools, research proposals, and the implementation, presentation and publication of research work.

At the end of this course, the student must be able to look for and identify a research topic of interest; prepare and present a research proposal on the identified topic; design and conduct experiments as well as to analyze and interpret data; understand professional and ethical responsibilities as they become familiar with the design and conduct of experiments or other research activities and awareness of research publication requirements; communicate effectively as they understand contemporary issues and the impact of engineering solutions in a global, economic, environmental and societal context; and use techniques, skills and modern engineering tools needed in the electronics engineering practice.
Co-requisite: EMA104 – Eng'g Data Analysis
Pre-requisite: PCOM – Purposive Communication

EECE111 3 units
DATA COMMUNICATIONS (LECTURE)
This course deals with data communication systems; terminals, modems; terminal control units; multiplexers; concentrators; front-end processors; common carrier services; data communication system design; computer network models; TCP/IP; principles; LAN; WAN.

At the end of this course, the student must be able to submit a Bldg plan with data network design and auxillary services using the Philippine standards.
Pre-requisite: EECE106- Communications 2

EECE111 L 1 unit
DATA COMMUNICATIONS (LABORATORY)
A laboratory course that covers training modules in two-wire and four-wire circuits, modems, SDH, and SONET.

At the end of this course, the student must be able to submit a Bldg plan with data network design and auxillary services using the Philippine standards.
Co-requisite: EECE111- Communications 3

EECE112 3 units
TRANSMISSION MEDIA, ANTENNA SYSTEM AND DESIGN (LECTURE)
This course deals with transmission media; radio wave propagation wire and cable transmission systems; fiber optic transmission system; transmission lines and antenna systems.

At the end of this course, the student must be able to design a wideband antenna (VHF and UHF).
Pre-requisite: EECE106- Communications 2

EECE112 L 1 unit
TRANSMISSION MEDIA, ANTENNA SYSTEM AND DESIGN (LABORATORY)
A laboratory course that covers experiments on transmission lines; antennas; measurement of frequency, wavelength, phase velocity in waveguides; generation of microwaves; detection of microwaves; attenuation measurement; and optical fiver system: numerical aperture, attenuation, modal theory.

At the end of this course, the student must be able to construct a wideband antenna based on the design submitted in the lecture class.
Co-requisite: EECE112- Communications 4

EECE113 3 units
MICROPROCESS, MICROCONTROLLER SYSTEMS AND DESIGN (LECTURE)
This course covers concepts involving microprocessor/microcontroller systems architecture/organization including microprocessor/ microcontroller programming, interfacing techniques, memory systems and bus standards.

At the end of this course, the student must be able to submit a project using microprocessor/ microcontroller with assembly or high-level language programming by groups.
Pre-requisite: EECE107- Digital Electronics 1

EECE113 L 1 unit
MICROPROCESS, MICROCONTROLLER SYSTEMS AND DESIGN (LABORATORY)
A laboratory course that covers experiments on assembler, cross-compiler, debugger; seven segment or LCD displays; switches and keypads; motors with TTL- input drivers.

At the end of this course, the student must be able to submit projects integrated with lecture, to be able to build a prototype using microprocessor/ microcontroller with the use of assembly or high-level languages to be done by groups.
Co-requisite: EECE113- Digital Electronics 2

EECE114 3 units
FEEDBACK AND CONTROL SYSTEMS (LECTURE)
This course deals with time and frequency response of feedback control systems. Topics covered include: time response of first and second order systems; modeling; transfer functions; pole-zero map; stability analysis; root locus; bode plots; compensators; PID controllers; and introduction to state space techniques.

At the end of this course, the students must be able to: Identify and demonstrate the difference of an open – loop and a closed – loop systems thru presentation of existing systems of their choice.
Pre-requisite: EECE103- Advanced Eng'g Math

EECE114 L 1 unit
FEEDBACK AND CONTROL SYSTEMS (LABORATORY)
A computer laboratory course that covers experiments that uses control system software.

At the end of this course, the student must be able to: create a short program to illustrate and answer a specific problem activity.
Co-requisite: EECE114- Feedback and Control Systems

EECE115 1 unit
ELECTRONICS ENGINEERING IMMERSION/ ON THE JOB TRAINING (OJT)
This course deals with the actual on-the-job training or industry internship in the field of specialization. This will cover 240 hours of OJT.

At the end of this course, the student must be able to: Relate theories learned in school to the actual technical and/or practical solutions to industrial problems; familiarize with varied plant operations and processes, operational techniques used and current management control; develop responsible attitude and self-motivation by systematically handling tasks in design and other activities relevant to Electronics Engineering; and develop good human relations in industrial operations.
Pre-requisite: 4th year standing

EECE116 3 units
COMPUTER SYSTEMS ARCHITECTURE (LECTURE)
This course deals with the design and performance evaluation of advanced/high performance computer systems. The emphasis is on microprocessors, chip-multiprocessors and memory hierarchy design. Historical information is presented as well along with data storage and low-power dissipation schemes. Special attention is paid to pipelining, ILP (Instruction Level Parallelism), DLP (Data-Level Parallelism) and TLP (Thread-Level Parallelism) using hardware and/ or software techniques to yield high performance.

At the end of this course, the student must be able to: design microprocessor based systems by accounting for performance and power dissipation.
Prerequisite: EECE113-Microprocess, Microcontroller Systems and Design

EECE116L 1 unit
COMPUTER SYSTEMS ARCHITECTURE (LABORATORY)
A laboratory course that covers experiments on fundamentals of quantitative design and analysis; instruction set principles; pipelining basic and intermediate concepts; memory hierarchy design; instruction-level parallelism; TLP; and DLP in vector, SIMD, and GPU architectures.

At the end of this course, the student must be able to: Perform experiments using software and equipment that covers the given topics and write reports about the activity. State experimental observation, interpret results clearly obtained from the experiments, and answer questions related to the performed experiment.
Co-requisite: EECE116-Computer Systems Architecture

EECE117 1 unit
DESIGN 1/CAPSTONE PROJECT 1 (LABORATORY)
This is the capstone course which utilizes the fundamentals of electronics engineering in the design of an electronic system. It includes the synthesis of processes, analysis of process conditions and the analytic, heuristic and optimum design of equipment and processes. Economic analysis is included to estimate the cost of equipment, capital investment, total product cost and profitability.

At the end of this course, the student must be able to submit a proposal by group that will include the essential elements of an electronic design project; use engineering economics to evaluate profitability; apply analytic and heuristic techniques in the design; use software and simulation techniques to design systems and processes and to analyze their performance; analyze and improve the performance of equipment and processes by incorporating technical standards, ethics, health, safety and environmental issues; model or simulate project or system design, develop oral and written skills; and work as a member of a design team.
Pre-requisite: EECE108, GE106, EECE112, EECE113

EECE118 1 unit
DESIGN 2/CAPSTONE PROJECT 2 (LABORATORY)
This is the continuation of EECE117 and is the implementation of the proposed concept in accordance to the research guidelines of the university. The students are required to submit and defend a working output of the technology proposed with a written documentation that corresponds to the research paper format of the university.

At the end of this course, the student must be able to submit and defend a working output of the design project based on the proposal done in design capstone 1.
Pre-requisite: EECE117

EECE119 3 units
OPERATING SYSTEMS AND ADVANCED PROGRAMMING LANGUAGES (LECTURE)
This course covers topics that are primarily based on CPU and memory management starting from the hardware architecture before moving to process scheduling and resource allocation; some general properties of process synchronization are investigated dealing with the classical problems of critical regions, producer-consumer relationship and the more general framework of the client-server schema.

At the end of this course, the student must be able to be acquainted with the software machinery devoted to control the processing operations of a computer; to understand the fundamental mechanisms which are the normal working background of the current computer systems; and the course terminates with a short presentation of O.S. kernels.
Pre-requisite: EECE116

EECE119L 1 unit
OPERATING SYSTEMS AND ADVANCED PROGRAMMING LANGUAGES (LABORATORY)
Operating Systems and Advanced Programming Languages
A laboratory course that covers experiments on the topics covered in the lecture.
At the end of this course, the student must be able to perform experiments using equipment and computer software applicable to the specified topics and write reports about the activity. State experimental observation, interpret results clearly obtained from the experiments, and answer questions related to the performed experiment.
Co-requisite: EECE119

EECE120 1 unit
SEMINARS/COLLOQUIUM (LABORATORY)
This course deals with a series of lectures and seminars on selected topics that are highly relevant to electronics engineering but are not covered in any of the other formal courses. It covers recent advances in electronics engineering. It is also a venue for the students to present their projects and researches.

At the end of this course, the student must be able to organize seminars relevant to the electronics engineering; and develop a sense of responsibility in fulfilling assigned tasks particularly in organizing seminars, colloquium and fora.
Pre-requisite: 4th year standing

EECE121 3 units
ECE LAWS, CONTRACT, ETHICS, STANDARDS AND SAFETY
This course deals with contracts: warranties; liabilities; patents; bids; insurance; and other topics on the legal and ethical positions of the professional engineer. It includes safety and other standards related to the ECE profession.

At the end of this course, the student must be able to submit a case study that will apply the laws to a given situation and know the rights and obligations of the parties; learn the intricacies of obligations and contracts; apply safety standards and other standards related to the engineering profession; and familiarize with the PEC codes.
Pre-requisite: 4th year standing

EIA1EC 1 unit
ENGINEERING INTENSIVE APPRAISAL 1
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: Recall basic mathematical concepts and techniques; identify and solve different problems in mathematics; apply different strategies in solving multiple choice problems.
Pre-requisite: EMA100, EMA101, EMA102, EMA103, EMA104

EIA2EC **1 unit**
ENGINEERING INTENSIVE APPRAISAL 2
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, electronics engineering law, engineering economics, engineering management, contracts and specifications, code of professional ethics, and others.

At the end of this course, the student must be able to: Identify and solve problems related to engineering sciences and allied subjects; apply different approaches to solving multiple choice problems.
Pre-requisite: CHM101, PHY101, PHY102, GE106, EECE103

EIA3EC **1 unit**
ENGINEERING INTENSIVE APPRAISAL 3
This course is a review on electronics engineering professional subjects such as: practical electronics, circuits 1 and 2, electronics 1, 2, and 3, digital electronics 1 and 2 and others.

At the end of this course, the student must be able to identify and solve problems in electronics engineering professional subjects; apply different approaches to solving multiple choice problems.
Pre-requisite: EECE 101, EECE 102,EECE105, EECE107, EECE108, EECE113, EECE114, EECE201,EECE202

EIA4EC **1 unit**
ENGINEERING INTENSIVE APPRAISAL 4
This course is a review on Electronics engineering professional subjects such as: Communications 1, 2, 3 and 4; Signals, Spectra and Signal Processing and others.

At the end of this course, the student must be able to identify and solve problems in electronics engineering professional subjects; apply different approaches to solving multiple choice problems.
Pre-requisite: EECE104, EECE106, EECE109, EECE111, EECE112,
Co-requisite: EECE121