UNIVERSITY OF ST. LA SALLE

Bachelor of Science in Computer Engineering (BSCpE)

Center of Development 2009-2015

Program Description

The Bachelor of Science in Computer Engineering is a program that embodies the science and technology of design, development, implementation, maintenance and integration of software and hardware components in modern computing systems and computer-controlled equipment.

Program Educational Objectives

Within three to five years after obtaining a bachelor's degree in Computer Engineering at University of St. La Salle, a graduate is expected to have:

1. Applied the analysis and design skills to equip and enable them to qualify for an employment in specific technical areas that includes:
   a. Hardware and/or software design of computer systems (embedded systems),
   b. Design of complex digital systems, focusing on computers, and
   c. Applications of these systems (embedded and complex digital systems such as in manufacturing, monitoring, control and/or communications)
2. Demonstrated interpersonal, teamwork and communication skills to enable them to be productive members of the interdisciplinary engineering teams.
3. Processed the necessary skills, confidence, professionalism, experience, and ethics to enable them to assume positions of technical and/or managerial leadership as their careers develop in their chosen specific field.

Program Outcomes

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

a. Apply knowledge of mathematics, sciences and engineering sciences in solving complex engineering problems that are associated with a broader scope of computer engineering and beyond that narrowly completing tasks in the real world.
b. Design and conduct experiment processes, as well as analyze, interpret and differentiate data relevant from irrelevant information that have implications to self, family, economic, environment, society and the Church.
c. Design digital systems, focusing on computers and applying computer engineering principles and methodologies in the analysis, implementation and management of hardware and software, and the integration of both; or processes to meet the desired needs within identified realistic constraints in a multidisciplinary approaches in solving real world problems within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards;
d. Function effectively and confidently in multi-disciplinary teams and multi-cultural teams;
e. Identify, formulate, and solve engineering problems; in the various context of design that refers to a level of ability beyond assembling or configuring systems using modern computing systems and computer – controlled equipment;

f. Demonstrate oneself effectively and confidently as professional with ethical responsibilities;
g. Communicate effectively in order to convey responsibly the computer engineering solutions that channel concerns of the body or individual, society and the Church;
h. Resolve industry based issues using Computer Engineering System Design with broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
i. Recognition of the need for, and an ability to engage in lifelong learning that creates and maintains a positive attitude and takes personal responsibility in taking care, protecting and preserving the environment with concrete actions on the societal and global concerns
j. Enumerate contemporary issues in the computer engineering industries and related fields leaning towards innovative approaches to solve real world problems.
k. Use techniques, skills, and modern engineering tools necessary for engineering practice; that are not limited to knowledge areas of Systems and Project Engineering, Embedded and Hardware Software Design, Development and Implementation to be locally and globally competitive and;
l. Associate management principles to chosen field of specialization in computer engineering as a member or leader in a team and effectively manage projects by committing to deadlines and confidently adapt to the changing environment that may arise within the duration of the projects in a multidisciplinary envir`onment.

Admission Policy

1. Students seeking admission to the program must have a GPA of at least 80%.
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 CpE 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.

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BACHELOR OF SCIENCE
Computer 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		EMA100
CHM101E	Chemistry for Engineers (Lec)	4	4	0	4		
CHM101EL	Chemistry for Engineers (Lab)	1	0	3	3		
ECPE101	Computer Engineering as Discipline	1	1	0	1		
GE101	Engineering Drawing	1	0	3	3		
IGG	Group Guidance 1	1.5	1.5	0	1.5		
NSTP1	National Service Training Program 1	3	3	0	3		
PED1	Physical Education 1 (Wellness and Fitness)	2	2	0	2		
ECPE102	Programming Logic and Design	2	0	6	6		
EMA100	Algebra and Trigonometry	3	2	3	5		
IRS1	Lasallian Spirituality	3	3	0	3		
	Total	**25.5**	**20.5**	**15**	**35.5**		

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	
ECPE105	Practical Electronics	1	0	3	3		
NSTP2	National Service Training Program 2	3	3	0	3	NSTP1	
ECPE104	Object Oriented Programming	2	0	6	6	ECPE102	
PED2	Physical Education 2 (Team Sports and Rhythmic Activities)	2	2	0	2	PED1	
EMA104	Engineering Data Analysis	3	3	0	3	EMA101	
ECPE103	Discrete Mathematics	3	3	0	3	EMA101	
IRS2	Christian Morality	3	3	0	3	IRS1	
PHY101E	Physics for Engineers (Lec)	4	4	0	4	EMA101	PHY101EL
PHY101EL	Physics for Engineers (Lab)	1	0	3	3		PHY101E
	Total	**26**	**22**	**12**	**34**		

SECOND YEAR

First Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
GE201	Computer-Aided Drafting	1	0	3	3	GE101	
ECPE201	Computer Hardware Fundamentals for CpE	1	0	3	3		
ECPE202	Data Structures and Algorithms	2	0	6	6	ECPE104	
EMA103	Differential Equation	3	3	0	3	EMA102	
ECPE203	Fundamentals of Electrical Circuits for CpE (Lec)	3	3	0	3	PHY101E	
ECPE203L	Fundamentals of Electrical Circuits for CpE (Lab)	1	0	3	3		
IRS3	Spirituality in the Workplace	3	3	0	3	IRS1	
PED3	Physical Education 3 (Swimming and Recreation)	2	2	0	2	PED1	
PCOM	Purposive Communication	3	3	0	3		
MATHMW	Mathematics for Modern World	3	3	0	3		
STS	Science, Technology and Society	3	3	0	3		
	Total	**25**	**20**	**15**	**35**		

Second Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
ARTAP	Art Appreciation	3	3	0	3		
USELF	Understanding the Self	3	3	0	3		
ECPE204	Fundamentals of Electronic Circuits for CpE (Lec)	3	3	0	3	ECPE203	ECPE204L
ECPE204L	Fundamentals of Electronic Circuits for CpE (Lab)	1	0	3	3		ECPE204
GBOOKS	Great Books	3	3	0	3		
ECPE206	Numerical Methods	3	3	0	3	EMA103	
PED4	Physical Education 4 (Individual and Dual Sports)	2	2	0	2	PED1	
PSPEAK	Public Speaking	3	3	0	3		
ECPE205	Software Design	4	3	3	6	ECPE202	
	Total	**25**	**23**	**6**	**29**		

THIRD YEAR

First Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
ECPE301	Computer Engineering Drafting and Design	1	0	3	3	ECPE204	
ECPE302	Data and Digital Communications	3	3	0	3	ECPE204	
GE106	Engineering Economics	3	3	0	3	3rd Year Standing	
ECPE303	Feedback and Control Systems	3	3	0	3	ECPE206, ECPE203	
ECPE304	Fundamentals of Mixed Signals and Sensors	3	3	0	3	ECPE204	
ECPE305	Introduction to HDL	1	0	3	3	ECPE102, ECPE204	
ECPE306	Logic Circuits and Design (Lec)	3	3	0	3	ECPE204	ECPE306L
ECPE306L	Logic Circuits and Design (Lab)	1	0	3	3		ECPE306
ECPE307	Operating Systems	3	3	0	3	ECPE202	
CPETE301	Software Development 1	3	2	3	5	3rd Year Standing	
	Total	**24**	**20**	**12**	**32**		

Second Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
ECPE308	Basic Occupational Health and Safety	3	3	0	3	3rd Year Standing	
ECPE309	Computer Networks and Security (Lec)	3	3	0	3	ECPE204	ECPE309L
ECPE309L	Computer Networks and Security (Lab)	1	0	3	3		ECPE309
ECPE310	CpE Laws and Professional Practice	2	2	0	2	3rd Year Standing	
LOGIC	Logic	3	3	0	3		
ECPE311	Methods of Research	2	2	0	2	EMA104,	PCOM, ECPE306
ECPE312	Microprocessors (Lec)	3	3	0	3	ECPE306	
ECPE312L	Microprocessors (Lab)	1	0	3	3		ECPE312
GE108	Technopreneurship 101	3	3	0	3	3rd Year Standing	
CPETE302	Software Development 2	3	2	3	5	CPETE301	
	Total	**24**	**21**	**9**	**30**		

Summer		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
ECPE407	On the Job Training **80 hours of field work per unit*	3	3	240*	3	4th Year Standing	
	Total	**3**	**0**	**240**	**3**		

FOURTH YEAR

First Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
ECPE401	Computer Architecture and Organization (Lec)	3	3	0	3	ECPE312	ECPE401L
ECPE401L	Computer Architecture and Organization (Lab)	1	0	3	3		ECPE401
ECPE402	CpE Practice and Design 1	1	0	3	3	ECPE311, ECPE312	
ECPE403	Digital Signal Processing (Lec)	3	3	0	3	ECPE304	ECPE403L
ECPE403L	Digital Signal Processing (Lab)	1	0	3	3		ECPE403
ECPE404	Embedded Systems (Lec)	3	3	0	3	ECPE312	ECPE404L
ECPE404L	Embedded Systems (Lab)	1	0	3	3		ECPE404
ECPE405	Emerging Technologies in CpE	3	3	0	3	4th Year Standing	
GENSOC	Gender and Society	3	3	0	3		
CPETE401	Software Development 3	3	2	3	5	CPETE302	
	Total	**22**	**17**	**15**	**32**		

Second Semester		Total Credit Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-requisite
ECPE406	CpE Practice and Design 2	2	0	6	6	ECPE402	
GE107	Engineering Management	2	2	0	2	3rd Year Standing	
ETHICS	Ethics	3	3	0	3		
RIZAL	Life and Works of Rizal	3	3	0	3		
RHIST	Readings in Philippine History	3	3	0	3		
ECPE408	Seminars and Field trips	1	0	3	3	4th Year Standing	
CWRLD	The Contemporary World	3	3	0	3		
LITE	Living in IT Era	3	3	0	3		
	Total	**20**	**17**	**9**	**26**		

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SUMMARY OF REQUIRED COURSES
BS Computer Engineering

	No. of Course Required	Unit Equivalent	Total Units
Technical Course			
Mathematics			
Calculus 1 – 2	2	8	
Differential Equation	1	3	
Engineering Data Analysis	1	3	
Algebra and Trigonometry	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			
Fundamentals of Electrical Circuits for CpE	2	4	
Fundamentals of Electronic Circuits for CpE	2	4	8
Professional			
Basic Occupational Health and Safety	1	3	
Computer Architecture and Organization	2	4	
Computer Engineering as Discipline	1	1	
Computer Engineering Drafting and Design	1	1	
Computer Hardware Fundamentals for CpE	1	1	
Computer Networks and Security	2	4	
CpE Laws and Professional Practice	1	2	
CpE Practice and Design 1	1	1	
CpE Practice and Design 2	1	2	
Data and Digital Communications	1	3	
Data Structures and Algorithms	1	2	
Digital Signal Processing	2	4	
Discrete Mathematics	1	3	
Embedded Systems	2	4	
Emerging Technologies in CpE	1	3	
Feedback and Control Systems	1	3	
Fundamentals of Mixed Signals and Sensors	1	3	
Introduction to HDL	1	1	
Logic Circuits and Design	2	4	
Methods of Research	1	2	
Microprocessors	2	4	
Numerical Methods	1	3	
Object Oriented Programming	1	2	
On the Job Training	1	3	
Operating Systems	1	3	
Practical Electronics	1	1	
Programming Logic and Design	1	2	
Seminars and Fieldtrips	1	1	
Software Design	1	4	74
Electives			
Software Development 1 – 3	3	9	9

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			
Gender and Society	1	3	
Great Books	1	3	
Life and Works of Rizal	1	3	
Living in IT Era	1	3	12
Physical Education			
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	16.5
	Total	**83**	**194.5**

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MAJOR COURSE DESCRIPTION
Bachelor of Science in Computer Engineering

CHM101E **4 units**
CHEMISTRY FOR ENGINEERS (LEC)
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 will perform the chemical processes that takes place in the environment, and identify key chemistry concepts related to the different fields of engineering.

ECPE101 **1 unit**
COMPUTER ENGINEERING AS A DISCIPLINE
This course discusses the curriculum for Computer Engineering as well as how to prepare students for success through engineering design process, ethical decision-making, teamwork, and communicating to diverse audiences.

At the end of the course, the students will analyze and present their findings on a given case study scenario that focuses on engineering design process, ethical-decision, teamwork and communicating activities to address multidisciplinary audiences.

ECPE102 **2 units**
PROGRAMMING LOGIC AND DESIGN
This is an introductory course in computer programming logic that discusses algorithms applicable to all programming languages, including: identifiers, data types, arrays, control structures, modular programming, generating reports, and computer memory concepts. The student will learn to use charts commonly used in business and information processing. Program logic will be developed using flowcharts and pseudo code. Programs will be written using any programming language.

At the end of this course, the student will create program solutions logically and break down programming problems into modules using debugging techniques and tools.

ECPE103 **3 units**
DISCRETE MATHEMATICS
This course deals with logic, sets, proofs, growth of functions, theory of numbers, counting techniques, trees and graph theory.

At the end of this course, the student will solve the mathematical ideas graphically, numerically, symbolically, and in writing; construct elementary direct proofs, indirect proofs, and proofs by contradiction; formulate and assess logical expressions and functions; analyze and solve problems involving sets and counting techniques and apply discrete mathematics in solving problems in the real world.
Prerequisite: EMA101

ECPE104 **2 units**
OBJECT ORIENTED PROGRAMMING
This 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, students will create and implement a mobile application using programming concepts and design in solving engineering problems.
Prerequisite: ECPE102

ECPE105 **1 unit**
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.

At the end of this course, the student will implement electronic circuits and perform troubleshooting.

ECPE201 **1 unit**
COMPUTER HARDWARE FUNDAMENTALS FOR CPE
This course provides an introduction to microcomputer systems hardware, operating system and application software. Installation of basic Local Area Network is also included. It covers topics on microcomputer installation, servicing and troubleshooting techniques, LAN setup and configuration. Concepts are learned through extensive hands-on activities. The proper use and care of tools and equipment are emphasized in the course.

At the end this course, the student will perform computer hardware servicing and installations.
Apply appropriate troubleshooting techniques.

ECPE202 **2 units**
DATA STRUCTURES AND ALGORITHMS
This course Solves computational problems that involve manipulating collections of data, study a core set of data abstractions, data structures, and algorithms that provide a foundation for writing efficient programs.

At the end of this course, the student will perform techniques in machine problems.
Apply data structures and algorithm analysis evaluation and troubleshooting.
Prerequisite: ECPE104

ECPE206 **3 units**
NUMERICAL METHODS
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 nonlinear equations, 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 discussed.

At the end this course, the student will use software application to estimate scenarios in the following areas in error bounds in numerical calculations; evaluate series expansions; solve differential equations; perform interpolation of functions; find the roots of equations; solve simultaneous linear and nonlinear equations. Create algorithms to implement these to the solution of engineering problems; prove theorems using logic.
Prerequisite: EMA103

ECPE205 **4 units**
SOFTWARE DESIGN
This course focuses on programming paradigms and constructs, data structures and use of standard library functions for manipulating them, object oriented design and the use of modeling languages, testing and software quality concepts, and tradeoffs among different software design methods.

At the end this course, the student will develop a software design project that implements data structures and manipulate them using functions in programming; use an object oriented approach and modeling languages and consider some different software design methods for multi discipline.
Prerequisite: ECPE202

ECPE301 **1 unit**
COMPUTER ENGINEERING DRAFTING AND DESIGN
This course focuses on the principles of layout of electrical, electronics, and logic drawings; stressing modern representation used for block diagrams, wiring and assembly, drawings, printed circuit board layouts, and etching.

At the end of this course, the student will create final drawing plate designs using CAD software application that analyzes, stimulates and troubleshoots logic circuits and integrates fundamentals of electronic circuits.
Prerequisite: ECPE204

ECPE302 **3 units**
DATA AND DIGITAL COMMUNICATIONS
This course focuses on the fundamental concepts of digital and data communications. It also includes topics on data security and integrity.

At the end of this course, the student will be able to explain concepts of analog and digital modulation and demodulation which requires critical thinking and analysis; develop critical thinking in analyzing the services and features of the layers of data networks; identify and explain the different internetworking devices and their functions and the role of protocols in networking.
Prerequisite: ECPE204

ECPE303 **3 units**
FEEDBACK AND CONTROL SYSTEMS
The course includes the control devices, equations of a systems and block diagram of systems.

At the end this course, the student will be familiarized with various systems exhibiting control mechanisms and perform their operation; develop the value of being analytic and able to apply learned concepts to improve systems; understand and appreciate feedback control; apply system-level thinking; demonstrate knowledge of concepts in dealing with feedback and control systems.
Prerequisite: ECPE206, ECPE203

ECPE304 **3 units**
FUNDAMENTALS OF MIXED SIGNALS AND SENSORS
This course covers operational amplifiers, signal converters, power switching devices and the construction and operation of sensors and transducers for converting physical parameters into electrical signals and vice-versa. The course focuses on the application of these devices in developing signal conversion circuits that allows measurement, processing and control of physical parameters by digital processing systems such as a finite state machine or a digital computer. Topics on actuators are also included.

At the end this course, the student will design amplifiers, signal converters, power switching devices, transducers and operation sensor, design a signal conversion circuits and use finite state machine or digital computer in digital processing systems.
Prerequisite: ECPE204

ECPE305 **1 unit**
INTRODUCTION TO HDL
This course introduces hardware description language as a tool for designing and testing combinational and sequential circuits. It covers fundamental of concepts of HDL and the basic building blocks of HDL programming.

At the end this course, the student will design, digital circuits using an HDL programming language. Analyze and simulate using HDL simulation tool.
Prerequisite: ECPE102, ECPE204

ECPE306 **3 units**
LOGIC CIRCUITS AND DESIGN (LEC)
The course includes design and analysis or digital circuits. This course covers both combinational (synchronous and asynchronous) logic circuits

with emphasis on solving digital problems using hardwired structures of the complexity of medium and large-scale integration.

At the end this course, the student will design and implement a combinational and/or sequential digital circuit.
Prerequisite: ECPE204
Co-requisite: ECPE306L

ECPE307 3 units
OPERATING SYSTEMS
This course includes different policies and strategies used by an operating system. Topics include operating systems structures, process management, storage management, file management and distributed systems.

At the end of this course, the student will develop simulation program of different techniques in operating system management.
Prerequisite: ECPE202

ECPE308 3 units
BASIC OCCUPATIONAL HEALTH AND SAFETY
This course covers key Occupational Health and Safety (OSH) concepts, principles and practices that are foundational knowledge requirements applicable in almost all industries. Specifically, it assists learners in identifying the key elements in the OSH situation both here and abroad; determine existing and potential safety and health hazards; identify the range of control measures; discuss pertinent provisions of Philippine laws that refer to occupational safety and health; explain key principles in effectively communicating OSH; identify components of effective OSH programs and demonstrate some skills in identifying hazards and corresponding control measures at the workplace.

At the end this course, the student will conduct a health and safety concerns case study analysis and provide recommendation in an industrial setting that focuses in 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.
Prerequisite: 3rd Year Standing

ECPE309 3 units
COMPUTER NETWORKS AND SECURITY (LEC)
The course includes the basic principles of network architecture, computer network design, services, technologies and network security.

At the end this course, the student will design a network project applicable to different types of topology and apply securities using industry standards.
Prerequisite: ECPE302
Co-requisite: ECPE309L

ECPE310 2 units
CPE LAWS AND PROFESSIONAL PRACTICE
This course provides the importance of the professional and ethical responsibilities of practicing computer engineers and the effects of their work on society; the importance of understanding contemporary issues, lifelong learning strategies; and applicable IT laws in the field of computer engineering.

At the end of this course, the student must present a case scenario with an impact for the Computer Engineering profession concerning ethical and social responsibilities, care on environment, morally upright and just. With consciousness of his/her rights and obligations as Filipino citizens and that he/she has the obligation to preserve societal and environmental sustainability.
Prerequisite: 3rd Year Standing

ECPE311 2 units
METHODS OF RESEARCH
This course will provide in-depth understanding of research through exploration of different research methodologies and ethics. It includes qualitative and quantitative research, descriptive and other applicable research methodologies, inferential statistics and introduction to data mining.

At the end this course, the student must submit required research paper applying different research methodologies.
Prerequisite: EMA104, PCOM, ECPE306

ECPE312 3 units
MICROPROCESSORS (LEC)
This course provides understanding of architecture of microprocessor/microcontroller based systems; registers, study of microprocessor/microcontroller operation, assembly language, arithmetic operations, and interfacing.

At the end this course, student will design a microprocessor/microcontroller-based system.
Prerequisite: ECPE306
Co-requisite: ECPE312L

ECPE401 3 units
COMPUTER ARCHITECTURE AND ORGANIZATION (LEC)
This course includes the study of the evolution of computer architecture and the factors influencing the design of hardware and software elements of computer systems. The focus is on the understanding of the design set architecture and hardware architecture. issues specifically the instruction.

At the end this course, the student will design a computer hardware architecture and/or organization.
Prerequisite: ECPE312
Co-requisite: ECPE401L

ECPE402 **1 unit**
CPE PRACTICE AND DESIGN 1
This course is the first course in a two-semester sequence that constitutes the design experience for undergraduate computer engineers. It provides essential ideas, concepts and principles in engineering design process and emphasizes other design issues including engineering standards and multiple constraints as well as effective communication strategies. Students work in teams to develop project proposals for assigned open-ended problems. Students are required to make oral presentations and submit written proposal for their projects.

At the end this course, the student will present and defend their design project proposal in team and submit an approved research documents.
Prerequisite: ECPE311, ECPE312

ECPE403 **3 units**
DIGITAL SIGNAL PROCESSING (LEC)
The course includes the need for and tradeoffs made when sampling and quantizing a signal; linear, time-invariant system properties; frequency as an analysis domain complementary to time; and filter design.

At the end this course, the student will perform practical applications in digital signal processing system; and have a broad foundation on basic DSP theory.
Prerequisite: ECPE304
Co-requisite: ECPE403L

ECPE404 **3 units**
EMBEDDED SYSTEMS (LEC)
This course provides advanced topics in embedded systems design using contemporary practice; interrupt-driven, reactive, real-time, object-oriented, and distributed client/server embedded systems.

At the end this course, the student will create an integrated output in a specific embedded system design.
Prerequisite: ECPE312
Co-requisite: ECPE404L

ECPE405 **3 units**
EMERGING TECHNOLOGIES IN CPE
This course is designed to provide flexibility in the curriculum by discussing any emerging technologies applicable to computer engineering.

At the end this course, the student will prepare a case study that integrates some emerging technologies in computer engineering in the implementation of their design projects or some requirements in this course.
Prerequisite: 4th Year Standing

ECPE406 **2 units**
CPE PRACTICE AND DESIGN 2
This course is the second of the design experience for undergraduate computer engineering students. In this course, students will be expected to build/ fabricate their design, test and evaluate the design against their design specifications, and demonstrate a fully functional project to their design review committee. Students make oral presentations and submit final reports documenting their projects.

At the end this course, the students will defend their fully-functioning design project to the review committee/panel. Submit the complete research documents of the said design project.
Prerequisite: ECPE402

ECPE407 **3 units**
ON THE JOB TRAINING
This course enables students to relate their acquired competencies to the realities and problems of industries in a multidisciplinary environment. This may include involvement in the industry's manpower requirements, development and research concerns, trainings, applications of principles, environmental concerns, ethical and behavioral concerns, decision making, and equipment and materials concerns.

At the end of this course, the student will participate in real organization related to his/ her field. Must complete the required number of hours in a company or organization where skills in planning, team management, communication skills and technical skills are applied.
Prerequisite: 4th Year Standing

ECPE408 **1 unit**
SEMINARS AND FIELD TRIPS
The course includes seminars and lecturers on current trends and issues on Computer Engineering developments. Include field trips to different companies and plants dealing with computer system facilities.

At the end this course, the student will prepare and submit written reports based on the plant visits and organize seminars that are relevant to computer engineering and must promote social responsibility to the community and to the environment.
Prerequisite: 4th Year Standing

CPETE301 **3 units**
SOFTWARE DEVELOPMENT 1 (PROJECT MANAGEMENT)
This course includes the fundamentals of project management; project management process; project management initiation; project planning and quality; time and resonance management; risk; health and safety; project cost and budget; the project team; contracts; procurement and closure failure mitigation.

At the end of this course, the student will implement different project management methodologies in a given case study scenarios.
Prerequisite: 3rd Year Standing

CPETE302 **3 units**
SOFTWARE DEVELOPMENT 2 (SYSTEM ANALYSIS AND DESIGN)
This course covers the different phases of systems development and engineering with focus on analysis and design. It covers how to handle requirements, architectural design, integration and verification and shall be facilitated thru project-team design approach in accordance with recognized standards. The students will also be introduced to recent work on the complexity of real world systems, with issues such as multi-level systems, and iterative development.

At the end of the course student will design an information system prototype using software development life cycle (SDLC) and methodologies with principles of systems analysis and design.
Prerequisite: CPETE301

CPETE401 **3 units**
SOFTWARE DEVELOPMENT 3 (DATABASE MANAGEMENT)
This course introduces database design and creation using a DBMS product. Emphasis is on data dictionaries, normalization, data integrity, data modeling, and creation of simple tables, queries, reports, and forms. Upon completion, students should be able to design and implement normalized database structures by creating simple database tables, queries, reports, and forms. The course also aims to develop the student's critical thinking and effective communication skills through active participation in class discussion which they can relate to social issues affecting the community and the environment.

At the end of this course, the student will model an application data requirement using conceptual modeling tools and implement it in a Database Management System (DBMS).
Prerequisite: CPETE302

ECPE204 **3 units**
FUNDAMENTALS OF ELECTRONIC CIRCUITS FOR CPE (LEC)
This course discusses the construction, operation and characteristics of basic electronic devices such as junction diodes, bipolar junction transistors, Field Effect Transistors, MOS Field Effect Transistors, transistor logic circuits and oscillators.

At the end this course, the student must be able to familiarize and solve problems on semiconductor physic, diode, and diode circuit analysis; analyze and solve problems on BJT, FET, transistor logic and oscillator circuits.
Prerequisite: ECPE203
Co-requisite: ECPE204L

ECPE203 **3 units**
FUNDAMENTALS OF ELECTRICAL CIRCUITS FOR CPE (LEC)
This course introduces the fundamental concepts, circuit laws, theorems and techniques used in electrical circuit analysis and transient analysis, as well as its application. The course covers circuit topologies and DC excitations, transient response, AC response, and polyphase circuits. The use of computer software for circuit simulation and design are emphasized to expose students to computer-based tools.

At the end this course, the student will perform the different ac and dc circuit parameters and components. An output that will solve problems in application of the different principles and theorems and laws in dc circuits solve problems involving RC, RL, RLC, single phase and three-phase systems using circuit theories and principles.
Prerequisite: PHY101E
Co-requisite: ECPE203L

GE101 **1 unit**
ENGINEERING DRAWING
This course introduces 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 will create drawing sheets and apply the basic concepts of technical drawing and sketching. Explain the importance of technical drawing knowledge and skills as applied to the various areas of engineering;

GE201 **1 unit**
COMPUTER AIDED DRAFTING
Concepts of computer aided drafting (CAD); 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 produce a graphical representation for engineering drawings for 2D and 3D models; Use the medium of drawings in engineering communications; describe the general principles involved in the use of engineering drawing; demonstrate the skills in interpreting, and producing engineering drawings accurately and efficiently; and demonstrate skills in computer-aided drafting to produce detailed 2D drawings.
Prerequisite: GE101

GE106 **3 units**
ENGINEERING ECONOMICS
This course deals concepts of the time value of money and equivalence; basic economy study methods; cost estimation; overview of feasibility study preparation; decisions under certainty; decisions recognizing risk; and decisions admitting uncertainty. Applications to materials engineering.

At the end of this course, the student will prepare a case study to evaluate project alternatives by applying engineering economic principles, methods and apply basic economic decision making concepts related to risk and uncertainty in project outcome.
Prerequisite: 3rd Year Standing

GE107 **2 units**
ENGINEERING MANAGEMENT
This course deals with decision-making; the functions of management; managing production and service operations; managing the marketing function.

At the end of this course, the student will submit an engineering management case scenario that describes and applies different functions of management.
Prerequisite: 3rd Year Standing

GE108 **3 units**
TECHNOPENEURSHIP 101
This course deals with concepts of technopreneurship with introspection of a business idea into a viable venture. The focus is on unleashing the entrepreneurial spirit of Engineering students.

At the end of this course, the student will present a business plan and defend which requires critical thinking and analysis; and relate the significance of technopreneurship in the socio-economic development of the country.
Prerequisite: 3rd Year Standing

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 will explore the use of any mathematical software in curve sketching, locate the maximum and minimum value(s) of a function, and
identifying one (1) real world application of derivatives.

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 multivariable 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 will utilize definite integration in finding the area of a plane region as well as the volume of a solid of revolution, and
utilize integral to solve conceptual and real-world problems.
Prerequisite: EMA101

EMA103 **3 units**
DIFFERENTIAL EQUATION
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 will explore the use of any mathematical software in solving ordinary differential equations, and identify practical engineering and scientific problems solved using differential equations.
Prerequisite: EMA102

EMA104 **4 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 will 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: EMA101

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.

At the end of this course the students are required to predict the outcomes of some actions or events, explain effectively why a certain phenomenon 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.
Pre-requisite: EMA101
Co - requisite: PHY101EL

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.