



## COURSE DESCRIPTIONS

**ELEC 311 ELECTRIC CIRCUITS I (3 Units)** – This course aims to equip students with the fundamental concepts of circuit laws, theorems and techniques used in electrical circuit analysis and transient analysis. The course topics covered includes, circuit elements, electrical energy and power, network reduction techniques, Kirchhoff's laws, cells and batteries, circuit analysis methods such as Mesh, Nodal, and Network theorems such as Superposition, Thevenin's and Norton's equivalent circuits. It also studies transient analysis of the series RL and series RC circuits and introductory concepts of alternating-current.

Pre-requisite: PHYS 222

**ELEC 311L ELECTRIC CIRCUITS I LAB (2 Units)** - This course allows the students to verify the laws and theorems discussed in ELCE 311 through experimentation and project construction. The course topics include experimental determination of the characteristics of the different circuit configurations, electrical power, Ohm's laws, Kirchhoff's laws, Superposition, Thevenin's equivalent circuit and maximum power transfer.

Pre-requisite: PHYS 222L

**ELEC 321 ELECTRIC CIRCUITS II (3 units)** – This course studies the principles of electric circuit analysis dealing with the frequency domain, complex algebra and phasors, simple AC circuits, impedance and admittance, mesh and node analysis for AC circuits, AC network theorems, resonance and filters, Power in AC Circuits, three-phase circuits, transformers, two-port network parameters and transfer function.

Pre- requisite: ELEC 311

**ELEC 321L ELECTRIC CIRCUITS II LAB (2 units)** – This course allows the students to verify the laws and theorems discussed in ELEC 321 through experimentation and project construction. The course topics include experimental determination of the characteristics of AC circuits, resonant circuits and filters.

Pre-requisite: ELEC 311L

**ECEE 231 ENGINEERING WORKSHOP (2 units)** - This course is an introduction to engineering workshop and practices and basic machine shop techniques. It aims to develop correct workshop attitude, whereby students learn the correct, safe and efficient use of basic machine shop tools and equipment. It also covers practical and realistic approach for developing skills in planning, designing and construction of electronic equipment.

Pre-requisite: None

**ECEE 311 – ELETRONIC DEVICES AND CIRCUITS (3 units)** – This course studies the construction, operation and characteristics of basic electronic devices such as vacuum tube, PN junction diode, Light Emitting Diode, Zener diode, Bipolar Junction Transistor and Field Effect Transistor. Diode circuit applications such as clipper, clamper, voltage multiplier and switching diode circuits will be part of the lecture. Operation and design of a DC regulated power supply will be taught. The course also presents analysis and design of BJT and FET amplifier as well as switching transistor circuit.

Pre-requisite: PHYS 222

**ECEE 311L – ELECTRONIC DEVICES AND CIRCUITS LAB (2 units)** – The experiments in this course supports the fundamental concepts introduced in ECEE 311. It familiarizes students with the basic electronic components, devices and equipment. It introduces the students to the basic electronic circuits such as rectifiers, regulator, amplifier, switching diode and transistor circuits.

Pre-requisite: PHYS 222L

**ECEE 312 ECE COMPUTER APPLICATIONS (3 units)** - This course studies computer-aided applications in circuit, Communication, electronics using available software such as Matlab, Electronic Workbench, Electronic CAD, Pspice etc.

Pre-requisite: PHYS 222

**ECEE 313 VECTOR ANALYSIS (3-Units)** – This studies vector and tensor algebra, geometry of curves and surfaces, vector functions of several variables, potential theory, and basic concepts of differential geometry. The student will be able to identify applicable method of solution in solving problems involving vectors, vector-valued functions and their processes including differentiation, integration, gradient, divergence, and curl.

Pre-requisite: MATH 224

**ECEE 321 ELECTRONIC CIRCUIT ANALYSIS AND DESIGN (3 units)** - This covers the analysis and design of various small signal amplifier circuits such as cascaded amplifiers, cascode amplifiers and feedback amplifiers for both BJT and FET. Analysis of amplifiers covers the dc analysis, ac analysis and frequency response. Other topics to be discussed are large signal amplifier, RF amplifiers and Oscillator circuits.

Pre-requisite: ECEE 311

**ECEE 321L ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB (2 units)** – The experiments in this course supports the fundamental concepts introduced in ECEE 321. It includes different responses and behavior of transistor circuits. The course includes analysis and design of amplifiers (class A, B, AB, C and D amplifiers, JFET and BJT amplifier circuits). It also includes AC small signal analysis of transistor circuits, RF amplifier, oscillators, multi-stage amplifier and feedback amplifier.

Pre-requisite: ECEE 311L

**ECEE 322 LOGIC CIRCUITS AND SWITCHING THEORY (3 units)** – In this course students will learn principles of digital logic systems and distinguish between analog and digital representations. They will be able to analyze a given combinational or sequential circuit using K-map and Boolean algebra as a tool to simplify and design logic circuits. Students will also construct and analyze the operation of a latches and flip-flops and their application in counters, registers, memory, input and output systems that form the building blocks of computers.

Pre-requisite: ECEE 311

**ECEE 322L LOGIC CIRCUITS AND SWITCHING THEORY LAB (2 units)** – The experiments in this course supports the fundamental concepts introduced in ECEE 322. The laboratory experiments expose the student to the basic principles of digital logic and logic circuit design. It covers both combinational and sequential logic circuits.

Pre-requisite: ECEE 311L

**ECEE 323 ELECTROMAGNETICS (3 units)** – This course allows the students to study electromagnetics which will lead to the study of its application to transmission lines, radiowave propagation, and antennas in the succeeding courses. This course covers Coulomb's and Gauss's Laws, Energy and Potential, Conductors, Dielectrics and Capacitance, Steady Magnetic Field, Maxwell's equations and Plane Wave concepts.

Pre-requisite: ECEE 313

**ECEE 324 NUMERICAL METHODS (3-Units)** - This course will cover numerical methods and other mathematical topics using computer-based solution techniques. Topics to be discussed include approximation and errors, numerical solutions of linear and non-linear systems of equations, numerical differentiation and integration, numerical solutions of ordinary and partial differential equations, curve fitting, regression analysis and probability. Students will be able to synthesize algorithms in specifying the methods of solutions for different engineering applications, and can evaluate proposed solutions and come up with critical judgment to determine the validity of these solutions.

Pre-requisite: MATH 222

**ECEE 411 ENGINEERING MANAGEMENT (2 units)** – This course studies industrial organization and management concepts, theories, principles, functions and practices such as 5-S and JIT. It also studies human behavior. Introduction to decision-making tools such as PERT-CPM and case studies are also included.

**ECEE 412 SIGNALS, SPECTRA AND SIGNAL PROCESSING (3 units)** - This course discusses various signal-processing techniques with emphasis on their application to speech and image processing. Topics include Z-transform, convolution, FIR filters, HR filters, random signal analysis, correlation functions, discrete fourier transform (DFT), fast fourier transform (FFT), spectral analysis, signal encoding and compression, signal recovery and extraction, noise reduction, and image enhancements.

Pre-requisite: MATH 321

**ECEE 412L SIGNALS, SPECTRA AND SIGNAL PROCESSING LAB (2 units)** - This laboratory course will enhance the students' understanding of linear system and signal processing with the use of computers in the form of laboratory exercises and computer-based project. It includes Matlab programming, discrete-time signal and system generation, operation and visualization, time to frequency and frequency to time conversion, time-frequency representation, and design of filters.

Pre-requisite: MATH 321

**ECEE 413 ECE LAWS, CONTRACTS AND ETHICS (2 units)** - This course discusses several laws affecting the ECE Profession including the law on Obligations and Contracts as provided in the Civil Code of the Philippines. This course also covers professional ethics, general ethics, and the other moral and ethical standards that the professional must adhere to when discharging his duties.

Pre-requisite: None

**ELEC 411 ENERGY CONVERSION (3units)** – This course covers the principles of balanced and unbalanced three-phase circuits, magnetic circuits, transformers, energy transforming machines, and DC and AC electro-mechanical energy converting machines. In this course the students would be exposed to the

different operational characteristics of electrical machines and their application. They would be able to understand the constructions and operations of various types of electro-mechanical converting machines and they would be able to describe how electrical machines behave under different operating conditions and applications.

Pre-requisite: ELEC 321

**ELEC 411L ENERGY CONVERSION LAB (2 units)** – This course supports ELEC 411 through experimentation and project construction. The course topics include experimental determination of the characteristics of three-phase circuits, magnetism and magnetic fields, transformers, DC generators, and DC motors.

Pre-requisite: ELEC 321L

**ECEE 421 INDUSTRIAL ELECTRONICS (3 Units)** – This course covers construction, characteristic and operation of the different types of thyristors and power switches that may be classified according to control, direction or latching capability. These industrial break-over devices may be utilized for power control or may be combined with other systems to provide a much better functional circuitry. The course also integrates different electronic systems learned from the previous electronic subjects for the discussion on topics dealing with measurements, instrumentation, transducers, control elements and data acquisition systems. It includes basic control devices such as mechanical or electromechanical switches and its integration to come up with a ladder diagram for industrial automation or control.

Pre-requisite: ELEC 322

**ECEE 421L INDUSTRIAL ELECTRONICS LAB (2 Units)** – This course allows the student to experiment on circuits involving the different types of thyristors and other power switches. It includes some basic transducers and sensor with the appropriate signal conditioning circuits for proper data acquisition.

Pre-requisite: ELEC 322L

**ECEE 422 SEMINARS AND FIELDTRIPS (2 units)** - This course is a combination of seminars and lectures on current developments in the field of electronics and communications. It involves exposure to various companies and plants dealing with electronics and communications facilities. Pre-requisite: None

**ECEE 425 PROFESSIONAL SUBJECT REVIEW I (2 units)** – This course will focus in the review of mathematics and general engineering sciences in preparation for Electronics Engineering Professional Board Exam.

Pre-requisite: MATH 324

**ECEE 426 SAFETY MANAGEMENT (2 units)** – This course is designed to equip students with the concept of management system that contributes to the protection of workers from hazards and to the elimination of work-related injuries, ill health, diseases, incidents and deaths in a work place. The course also covers the protection of co-workers, family members, employers, customers, suppliers, nearby communities, and other members of the public who are impacted by the workplace environment.

Pre-requisite: None

**ECEE 431 MICROPROCESSORS AND SYSTEMS (3 units)** - This course is designed to equip the students with the fundamental concepts of the microprocessor system and their applications. It also serves as an introduction to computer organization and architecture. It focuses on practical exercises with emphasis on microprocessor programming, interfacing, and controllers.

Pre-requisite: ELEC 322, GEAS 222

**ECEE 431L MICROPROCESSORS AND SYSTEMS LAB (2 units)** - This course supports ECEE 431 through microprocessor programming and microprocessor based experiments and projects.

Pre-requisite: ELEC 322L, GEAS 222

**ECEE 513 FEEDBACK AND CONTROL SYSTEMS (3 Units)** – This course introduces the students to the theory and practice of control system engineering, emphasizing on classical control theory and covering fundamentals of modern control theory. The teaching approach will be both qualitative and quantitative. Various control systems will be discussed – emphasizing how the different system variables interact and how they affect system performance, qualitatively.

Pre-requisite: ELEC 322, ECEE 421

**ECEE 513L FEEDBACK AND CONTROL SYSTEMS LAB (2 Units)** – This course introduces the students to the application of the theories and practice of control system engineering, emphasizing on classical control theory and covering fundamentals of modern control theory. The course approach is laboratory based and will be through numerical simulations using Matlab.

Pre-requisite: ELEC 322L, ECEE 421L

**ECEE 425 PROFESSIONAL SUBJECT REVIEW II (2 units)** – This course will focus in the review of electrical, electronics and communications courses in preparation for Electronics Engineering Professional Board Exam. Pre-requisite: COMM 421, ECEE 421

**ECEE 521 ON-THE-JOB TRAINING (6 units)** – This course is for Industry exposure of students for them to match school acquired competencies and knowledge to the realities and problems of industry. This may include involvement in industry's energy and manpower requirements, development and research concerns, training, applications of principles, environmental concerns, ethical and behavioral concerns, decision making, equipment and materials management.

## **COMMUNICATIONS ENGINEERING COURSES**

**COMM 331 PRINCIPLES OF COMMUNICATIONS (3 units)** – This is an introductory course on the principles of communication systems with emphasis on signal modulation and transmission. Topics include design of filters and noise reduction circuits, amplitude, frequency, and phase modulation circuits, pulse modulation, time and frequency division multiplexing.

Pre-requisite: MATH 321, ELEC 321, ECEE321

**COMM 331L PRINCIPLES OF COMMUNICATIONS LAB (2 units)** - In this laboratory course, the student obtains hands-on experience on the application of the theoretical concepts of analog signals and analog communication systems introduced in the lecture course COMM 331. In studying signals, the students will expand their knowledge in the use of the oscilloscope and will be introduced to the use of the frequency analyzer (FFT-capable digital storage oscilloscopes), spectrum analyzers,

and the arbitrary waveform generators. Amplitude Modulation (AM) and Angle Modulation systems will be studied in detail.

Pre-requisite: MATH 321, ELEC 321L, ECEE321L

**COMM 411 DIGITAL COMMUNICATIONS (3 units)** - This subject provides an in-depth treatment on the conversion of analog signals to digital signals, the use and the transmission of digital signals in communication systems. This subject also includes topics in information theory, multiplexing method, fiber optic communications and telephony.

Pre-requisite: COMM 331

**COMM 411L DIGITAL COMMUNICATIONS LAB (2 units)** - This Laboratory course will enhance the students' understanding of digital communication system with the use of Matlab through its signal processing toolbox, communication instrument control toolbox. Exercises will be focused on source coding, channel coding, modulation and demodulation, synchronization and Channel distortion.

Pre-requisite: COMM 331L

**COMM 421 TRANSMISSION MEDIA AND ANTENNA (3 units)** - This course includes a detailed study of transmission line, its electrical model, the important parameters and characteristics that describe its operation. The study includes the nature and behavior of radio waves as they propagate through free space and other mediums. It also includes the basic principles of operation of antenna systems and its accompanying properties.

Pre-requisite: COMM 411

**COMM 421L TRANSMISSION MEDIA AND ANTENNA LAB (2 units)** - In this laboratory course, the students perform experiments on the application of the theoretical concepts of signal transmission on different media, particularly air and metallic conductors, introduced in the lecture course COMM 411. Experiments in this course involve the use of several antenna system trainers, transmission lines and different antenna feeding techniques. The course requires the students to design an antenna system.

**ECEE 432 ENGINEERING DESIGN (3 units)** - This course discusses the operating performance and interface standards for voice and data circuits. It also discusses private communications systems planning and design, and communications plant design and construction including foundations and structure. Topics also include analysis and design of electronic systems, the system specification, construction and operation.

Pre-requisite: COMM 411L

**ECEE 511L ELECTRONICS ENGINEERING DESIGN LAB (2 units)** – This course intends to produce a project consisting of a guided design and implementation of an engineering product. This project offers students in small teams an opportunity to apply their knowledge in electronics, electrical machines, computer hardware and software as well as project management, following a disciplined engineering process, to achieve the final goal.

Pre-requisite: COMM 421L

**ECEE 512L COMMUNICATIONS ENGINEERING DESIGN LAB (2 units)** - In this course the students engineer build or simulate a communication system. This process will include producing specifications, detailed design, if possible prototype production and testing.

Pre-requisite: COMM 421L

**COMM 511 DATA COMMUNICATIONS (3 units)** – This course deals with the theory, technologies and techniques of data communications. Topics include network design, internet protocol, and other related topics. The course aims to give insights how networks are structured and for the students to see the issues facing the design of data networks.

Pre-requisite: COMM 411

**COMM 511L DATA COMMUNICATIONS LAB (2 units)** – In this laboratory course, the student obtains hands-on experience on the application of the theoretical concepts of data transmission systems introduced in the lecture course Data Communications. This laboratory course involves experiments on technologies and techniques in data communications. Topics include PC-PC communications, wireless data transmission and other related topics. The course aims to give the students a hands-on experience on how data are processed, transmitted and received.

Pre-requisite: COMM 411 L

### **GENERAL ENGINEERING AND APPLIED SCIENCES (GEAS)**

**DRAW 111 ENGINEERING DRAWING 1 (2 units)** – This is an introductory course to engineering drawing designed to teach students to render, translate and understand technical drawings. Topics include orthographic projection, descriptive geometry, isometric drawing and sectioning, assembly drawing, exploded views and fundamentals of Computer-Aided Design (CAD).

**DRAW 121 COMPUTER-AIDED DRAFTING (2 units)** - This course introduces and describes the concepts of electronic/computer-aided drafting and the capabilities of AutoCAD. This also covers an introduction to the AutoCAD environment, terminologies, and the general operating procedures and various techniques in entering and executing basic AutoCAD commands.

Pre-requisite: DRAW 111

**GEAS 211 COMPUTER FUNDAMENTALS AND PROGRAMMING (3 units)** – This course focus on the computer fundamentals and a study of C programming language; syntax, description, modularity and parameters, functions, recursions, data types and structures, input-output operations, iteration, function declaration, recursion, and file manipulation.

Pre-requisite: MATH 111, MATH 112

**GEAS 222 ASSEMBLY LANGUAGE (3 units)** – This course deals with the fundamentals of assembly language programming concepts and techniques. Topics include internal representation of data, arithmetic operations, logic statements, and general assembly language commands. Introduce low level language architecture including assemblers, linkage editors, and loaders.

Pre-requisite: GEAS 211

**GEAS 233 ENVIRONMENTAL SCIENCE (3 units)** – This course introduces the students to the effects of engineering works on the environment, ecology, environmental economics, environmental laws and policies, waste treatment, water and energy management, environmental engineering practices and international policies on electromagnetic interference.

Pre-requisite: None



**GEAS 231 ENGINEERING ECONOMY (3 units)** – This course studies Principles of accounting, time value of money, cash flow analysis, present and future worth analyses, depreciation and financial accounting, effects of inflation, income taxes and marketing goals.

Pre-requisite: MATH 224

**GEAS 232 STATIC OF RIGID BODIES (3 units)** – This course allows the students to learn the topics in statics and dynamics, operations with the free body concept, equilibrium of coplanar and non-coplanar force systems, analysis of frames and trusses. It also includes topics in friction, moments of inertia, motion of particles and rigid bodies, force, mass and acceleration, work and energy and impulse and momentum.

Pre-requisite: PHYS 222

**GEAS 312 DYNAMICS OF RIGID BODIES** – This course studies the displacement, velocity and acceleration of particles of rigid bodies with combined translation and rotation. It will also study reaction and inertia forces and mass and polar moments of inertia, the analysis by equations of motion, force-acceleration, work-energy, and impulse-momentum. Topic also includes conservative and non-conservative forces and moments, free and forced vibrations, natural frequency, and fundamentals of damping and vibration isolation.

Pre-requisite: GEAS 232

**GEAS 333 MECHANICS OF DEFORMABLE BODIES (3 units)** - This course focuses on the strength of solid materials. It includes the topics on axial stress and strain; stresses for torsion and bending; combined stresses; beam deflections; indeterminate beams; and elastic instability.

Pre-requisite: GEAS 312

**GEAS 411 MATERIALS SCIENCE AND ENGINEERING (3 units)** - This course discusses the physics of materials with emphasis on the mechanical, acoustical, electrical, magnetic, chemical, optical and thermal properties of various materials such as polymers, ceramics, glasses and semiconductors. In particular, it covers the topics of structure of amorphous and crystalline solids, defects in solids, X-ray diffraction theory, phase equilibrium, kinetics of crystallization, diffusion in solids, and materials processing and design.

Pre-requisite: GEAS 333

**GEAS 412 THERMODYNAMICS (3 units)** - This course allows the students to learn the fundamental concepts of energy and heat transfer. It includes a discussion on the Laws of Thermodynamics, energy and property relationships, ideal gas laws, thermodynamics processes and cycle and mechanism of heat transfer.

Pre-requisite: GEAS 333

## **TRACK ELECTIVE COURSES**

### **A. COMMUNICATIONS**

- Wireless Communication
- Communications System Design
- Navigational Aids
- Broadcast Engineering



- Advanced Electromagnetism
- DSP

#### B. MICROELECTRONICS TRACK

- Advanced Electromagnetism
- Embedded System
- Introduction to Analog Integrated Circuits Design
- Introduction to Digital VLSI Design

#### C. POWER ELECTRONICS TRACK

- Introduction to Power Electronics
- Power Supply Application
- Semiconductor Devices for Power Electronics
- Motor Drives and Inverters

#### D. INSTRUMENTATION AND CONTROL

- Mechatronics
- Robotics
- Modelling and Simulation
- Digital Control System

#### E. INFORMATION AND COMPUTING TECHNOLOGIES

- Computer Systems
- I/O Memory System
- Computer Systems Architecture
- Data Structure & Algorithm Analysis
- Computer Systems Organizations
- Structure of Program Language
- Operating Systems
- Artificial Intelligence