CURRICULUM OVERVIEW

The fully online Master of Science in Electrical Engineering curriculum comprises 30 credit units divided into nine (9) units of Core Courses, nine (9) units of Major Courses, six (6) units of Elective Courses, and six (6) units of Master’s Thesis.

No. of terms : 6 terms
No. of units : 30 units

- Core courses : 3 courses 9 units
- Major courses : 3 courses 9 units
- Elective courses : 2 courses 6 units
- Master’s Thesis : 2 courses 6 units

Total 12 Courses 30 Units

CORE COURSES

Math220-1ol. Advanced Engineering Mathematics

The course deals with Power series solution, Bessel’s functions, Fourier series, Fourier transform, Hilbert transform, solution of boundary and initial-value problems, algebra of vectors, vector integration, vector application.

Credit: 3 Units
Prerequisite: None

Math221-1ol. Numerical Methods for Ordinary and Partial Differential Equations

The course deals with numerical solution to initial value and boundary value ODE problems, numerical solution to system of ordinary differential equations, finite difference methods, finite volume methods, and finite element methods.

Credit: 3 Units
Prerequisite: None

Res290-1ol Research Techniques

The course deals with research design, analysis and interpretation of data, basic research methods, and qualitative and quantitative research techniques.

Credit: 3 Units
Prerequisite: None
MAJOR COURSES

EE220-OL. ECONOMIC OPERATION AND CONTROL OF POWER SYSTEMS

A course on the economics of energy generation and utilization, optimization methods, mixed-generation dispatch, optimal load flow analysis, includes a study of synchronous systems, prime movers, load frequency control and system voltage control; includes recent development.

Credit: 3 Units
Prerequisite: None

EE222-OL. FAULT TOLERANT POWER SYSTEMS

A course on symmetrical components, sequence impedance of transmission lines, transformers and synchronous machines, sequence network, unbalanced and simultaneous faults calculations; includes recent developments.

Credit: 3 Units
Prerequisite: None

EE249-OL. SMART GRID IN POWER SYSTEM

A course that deals with the study of smart grid as applied into the electric system integrating many types of generation and storage systems with a simplified interconnection process. It also describes the components of the grid and the tools needed to realize its main goals in communication systems, intelligent meters, and appropriate computer systems to manage the grid.

Credit: 3 Units
Prerequisite: None

ELECTIVE COURSES

CPE201-OL. DIGITAL IC DESIGN

This course deals with the fundamentals of IC design as well as chip layout and simulation from frontend digital RTL design, synthesis and implementation, to digital physical / backend design and design for test (DfT) jobs. Topics include bipolar and MOS field effect transistor characteristics; VLSI fabrication techniques for MOS and bipolar circuits; calculation of circuit parameters from the process parameters; design of VLSI circuits such as logic, memories, charge-coupled devices, and A/D and D/A converters.

Credit: 3 Units
Prerequisite: None
CPE202-OL. ADVANCED COMPUTER SYSTEM ARCHITECTURE

The course covers the theory and life cycle the architecture and design of microcomputer systems utilizing microprocessors or microcontrollers; such as instruction set architectures, software interfaces, processor structures, memory hierarchy, and interfacing. The course emphasizes the following subsystems of high performance computers: pipelining, instruction level parallelism, thread level parallelism, memory hierarchies, input/output, and network oriented interconnections.

Credit: 3 Units
Prerequisite: None

CPE203-OL. DESIGN OF DIGITAL SYSTEMS AND COMPUTERS

The course covers topics on consideration for design and application of digital systems, computer and computer controlled equipment including the concepts and design of embedded systems, central processing unit issues, interrupt structures, as well as input/output technologies.

Credit: 3 Units
Prerequisite: None

CPE211-OL. HARDWARE DESCRIPTION LANGUAGE

A course using programming language as a tool to describe the behavior or structure of digital circuits (ICs). Topics include design, programming and simulation of digital circuits using available HDL compilers like Verilog, VHDL, Abel HDL, etc; basic concepts of HDL, data flow modelling, behavioral modelling, and advanced programming; and its practical applications in the design and simulation of a digital circuit.

Credit: 3 Units
Prerequisite: None

CPE213-OL. DIGITAL ASIC DESIGN WITH FPGA

This course will introduce digital design techniques using Field Programmable Gate Array (FPGA). It will also tackle FPGA architecture with associated laboratory exercises in designing digital systems.

Credit: 3 Units
Prerequisite: None

CPE214-OL. REAL TIME EMBEDDED SYSTEM

A course with real time application of embedded systems. It covers the characteristics of different applicable sensors as well as laboratory exercises using sensors and microcontrollers.

Credit: 3 Units
Prerequisite: None
CPE215-OL. NEURAL NETWORKS

The course deals with the development of intelligent machines through the use of processing elements. Topics include configuration designs, connection schemes, and learning methodologies. Supplementary topics include self-organization, cognitive sciences and neural networks.

Credit: 3 Units
Prerequisite: None

CPE217-OL. ADVANCED SOFTWARE ENGINEERING

The topics for the course include advanced theoretical concepts in software engineering and various issues of software development; group software development project spanning, project planning and management, analysis of requirements, construction of software architecture and design, implementation and quality assessment; and formal specification, component-based software engineering, maintenance and evolution.

Credit: 3 Units
Prerequisite: None

CPE218-OL. ALGORITHMS IN VLSI DESIGN

The course covers the different topics available on design methodologies in VLSI automation tools such as high-level behavioral synthesis; performance and power-efficient algorithms in architectural synthesis and optimization including module selection, allocation, and scheduling; and system-level synthesis. The course also includes architectures and algorithms for the automatic design of systems-on-chip and embedded systems which include hardware/software partitioning, hardware/software synthesis, and software design under hardware constraints.

Credit: 3 Units
Prerequisite: None

CPE220-OL. SPECIAL TOPICS IN COMPUTER ENGINEERING

Current topics of interest in computer engineering; topic may vary from term to term depending on the interest of the instructor.

Credit: 3 Units
Prerequisite: None

ECE220-OL. MICROELECTRONICS DEVICES AND CIRCUITS

Characteristics of semiconductors; study of physical mechanisms and circuit modeling of solid state electronic and photonic devices; principles of microelectronic processing and examples of integrated circuits.

Credit: 3 Units
Prerequisite: None
ECE211-OL. SIGNALS AND SYSTEMS

Continuous and discrete-time transform analysis, linear and time-invariant systems, transfer functions, Fourier transform, Laplace transform, z-transforms, digital sampling and aliasing, sampling and reconstruction, solutions to differential and difference equations using transforms, frequency response, Bode plots, and stability analysis.

Credit: 3 Units
Prerequisite: None

ECE222-OL. DIGITAL INTEGRATED CIRCUIT

CMOS device and deep sub-micron manufacturing technology, CMOS of metrics, cost reliability, performance and power dissipation, sequential circuits, timing considerations and locking approaches; degree of large system blocks, including arithmetic, interconnect, memories and programmable logic arrays; introduction to design methodologies, including hands-on experience.

Credit: 3 Units
Prerequisite: None

ECE223-OL. ANALOG INTEGRATED CIRCUITS

Bipolar and MOS analog integrated circuit (IC) analysis and design. DC biasing for IC’s, current sources, sinks and active loads, band gap references, input and output stages, Op Amp architectures, nonlinear analog IC’s. Computer simulation of analog IC’s.

Credit: 3 Units
Prerequisite: None

ECE224-OL. DYNAMIC SYSTEMS AND CONTROL

Linear, discrete-, and continuous-time, multi-input-output systems in control, least squares and matrix perturbation problems, state-space models, modes, stability, controllability, observability, transfer function matrices, poles and zeroes, minimality, internal stability of interconnected systems, feedback compensators, state feedback, optimal regulation, observers, observer-based compensators, measures of control performance, robustness issues using singular values of transfer functions, and introduction to nonlinear systems.

Credit: 3 Units
Prerequisite: None
A course covers simulation tools used in restructured power system for studying the economics and security of power systems. Topics include modeling of generating units (thermal units, combined cycle units, fuel-switching/blending units, hydro units, pumped storage units, photovoltaic, wind etc). Also the simulation and scheduling tools consider in different time scales including on line security, day ahead, operational planning and long term.

Credit: 3 Units  
Prerequisite: None

The first of the two course series on research is primarily intended for students who will undertake independent research. A working paper culminates in a research proposal to include: problem statement, its rationale and importance, research methodology, tentative outline of contents, and bibliography. The proposal is submitted for assessment, review and acceptance by a panel of critics.

Credit: 3 Units  
Prerequisite: RES290-1OL

The second course on research requires the completion of a thesis based on proposed and accepted research topic. The completed thesis must be defended to a panel and a final written report must be submitted for approval. The final thesis document may be published to a Scopus-Indexed Journal or Conference Proceedings.

Credit: 3 Units  
Prerequisite: EE300-1OL

Year 1

1st Quarter: Numerical Methods for Ordinary and Partial Differential Equations, Economic Operation and Control of Power System

2nd Quarter: Advanced Engineering Mathematics, Fault Tolerant Power System

3rd Quarter: Research Techniques, Smart Grid in Power System

4th Quarter: Elective 1, Elective 2
Year 2

1st Quarter: Master’s Thesis 1

2nd Quarter: Master’s Thesis 2

For the Electives Courses (The students can choose the elective courses in the list below):

1. Digital IC Design
2. Advanced Computer Systems Architecture
3. Design of Digital Systems and Computers
4. Signals and Systems
5. Digital Integrated Circuit
6. Analog Integrated Circuit
7. Microelectronics and Devices
8. Dynamic Systems and Control
9. Advanced Software Engineering
10. Hardware Description Language (HDL)
11. Real Time Embedded System
12. Digital ASIC Design with FPGA
13. Neural Networks
15. Special Topics in Computer Engineering

PROGRAM COST

Promotional cost per unit is Php 2,500 (all inclusive rate).

FAQS

What Background is necessary for the MSEE program?

The MSEE is designed for undergraduates with a degree in Electronics Engineering, Electronics and Communications Engineering, Computer Engineering and Electrical Engineering.
How do I apply for the program?

Applicants need only to fill out the online application form and to submit scanned copies of their transcript of records, two recommendation letters, and an English language proficiency certification – TOEFL, TOEIC, IELTS or equivalent (for foreign students) here.

Original copies of the requirements must be sent to the registrar at:

Office of the University Registrar
Mapúa University
658 Muralla Street
Intramuros, Manila
Philippines 1002

Graduates from abroad must submit the original copies of requirements authenticated by the Philippine Consulate General (with red ribbon and seal).

How many course units are required to complete the program?

A student should earn 30 course units to complete the MSEE program and earn the degree.

How quickly can I complete the program?

As Mapúa University's Academic Year follows a quarter system, a student can complete the MSEE program in six (6) quarters, subject to other graduation requirements.