Brief outline of Program Courses

MI1110 Calculus I

4 (3-2-0-8)

Provide students with basic knowledge about single variable and multiple variables functions. On that basis, students can continue to study the following sections of Mathematics as well as other technical subjects, contributing to the foundation of Basic Mathematics for engineers of technology and economics.

MI1120 Calculus II

3 (2-2-0-6)

Prerequisite: MI1110 (Mathematical analysis I)

Provide students with basic knowledge of dependent integral, Integrating multiples of two and three multiples, Integrating line and face, Application of differential equation to Geometry and Field theory. On that basis, students can continue to study the following sections of Mathematics as well as other technical subjects, contributing to the foundation of Basic Mathematics for engineers of technology and economics.

MI1130 Calculus III

3 (2-2-0-6)

Prerequisite: MI1110 (Mathematical analysis I)

Provide students with basic knowledge of String number, Function string, Exponential string, Fourier chain, along with the basic knowledge of First-order differential equations, Second-order differential equations and the basic part about System of first-order differential equations. On that basis, students can continue to study the following sections of Mathematics as well as other technical subjects, contributing to the foundation of Basic Mathematics for engineers of technology and economics.

MI1140 Algebra

4 (3-2-0-8)

Provide students with basic knowledge of Theory of Matrices, Determinant, and System of linear equations, minimal knowledge of Logic, Collection, Logical mapping, Complex number fields, and simple ideas about second-order surface, second-order line. On that basis, students can continue to study the following sections of Mathematics as well as other technical subjects, contributing to the foundation of Basic Mathematics for engineers of technology and economics.

IT1110 Fundamentals of Informatics

4(3-1-1-8)

Prerequisite:

Objectives: Equip students with basic knowledge of computer structure and organization, computer programming and mechanisms for implementing basic programs, basic skills to effectively use computers in learning, researching and working in engineering and technology areas.
Content: Basic informatics: Performing information in computers. Computer system. Linux operating system. Programming in C language: C Language overview. Data structure, expression and programming structure in C. Complex data types: pointers, arrays and strings in C. Arrays. Structure. Data file.

EM1010 Fundamentals of Management

2 (2-0-0-4)
Prerequisite:
Objective: Equip students with basic knowledge and skills of managing business activities.
Content: Nature, content and role of business management; implementing method of each type of work and enterprise management staff.

PH1110 Physics I

3 (2-1-1-6)
Prerequisite:
Objective: Provide students with basic knowledge of General Physics (mechanical, thermal), as a basis for technical students.
Content: Basic physical quantities and related rules such as Momentum, Theorems and laws of momentum; theorems and laws of momentum moments; kinetic energy, potential energy, conservation law of energy. Apply to study solid rotation, oscillation and mechanical wave motion.
Molecular dynamics theory uses explanatory statistics and calculating amounts: temperature, pressure, internal energy (ideal gas). Apply conservation and convert laws of energy on thermal transition processes. Study the direction of the evolution of thermal processes, the principle of increasing entropy.

PH1120 Physics II

3 (2-1-1-6)
Prerequisite:
Objectives: Provide students with basic knowledge of General Physics (electromagnetism).
Content: Types of fields: Electric and magnetic fields; properties, specific quantities (intensity, voltage, magnetic flux, ..) and related theorems and laws. The interaction between field and material. The relationship between the magnetic field and the electric field, unification of electromagnetic field. Apply to oscillations and electromagnetic waves.

MI2020 Probability

3 (2-2-0-6)

Prerequisite: MI1110 (Mathematical analysis I), MI1140 (Algebra).

Objective: Provide students with the knowledge of probability such as concepts and rules of deductive probability as well as random variables and joint probability distributions (one and two dimensions); The basic concepts of mathematical statistics in order to help students handle statistical problems in estimating models, verification of linearity and linear regression. On that basis, students can approach actual models to gather needed knowledge for solving those problems.

Content: Random event and probability calculation, random quantities, probability distribution, random vector, statistical estimation theory, statistical decision theory.

PH1130 Physics III

3 (2-1-1-6)

Prerequisite: PH1110 (Physics I), PH1120 (Physics II).

Objective: To provide students with basic knowledge of General Physics (optics, quantum physics) as a basis for technical students.

Content: The properties of light: Wave calculation (interference, diffraction ..), particle count (thermal radiation, Compton), emission (natural, induction) and absorption of light and laser.

Applying wave-particle amphoteric of electrons (micro-particles) to study atomic energy and spectra, Pauli state and principle, study electrical properties of materials (metals, semiconductors), spins and Quantum statistics.

ME2040 Mechanical Engineering

3 (3-1-0-6)

Prerequisite:

Objective: Students gain knowledge of building the force-model, establishing the equilibrium of force equation, two basic problems of motivation and basic methods to solve them, the equations of the machine's motion.

Content:

Part 1. Static studies: Building force model, reducing flat force system, establishing an equilibrium equation of flat force system acting on solid objects. Simplify the space force. Establish equation of the space force system. Mass and gravity center of a solid object.

Part 2. Kinetics: Kinetic characteristics of solid objects and its physical points. The formula to calculate velocity and acceleration for basic movement of solid objects. Summary of points and object movements.

Part 3. Dynamics: Point and object dynamics. Newton's laws, the general theorems of dynamics, the D'Alembert principle, the method of Static geometry - The dynamics, the moving equations of the machine.

EE 1010 Introduction to Electrical Engineering

3 (2-0-3-6)

Objectives: Help new students get acquainted with Electrical Engineering, Automation and Control Engineering to further understand the industrial characteristics, knowledge and skills requirements for the engineer. At the same time helping students gain the passion and confidence in learning and career path; Facilitate students to take the first step in solving practical problems, practice at least minimum required skills as well as teamwork skills, writing reports and presentations skills.
Contents: Teaching class or discussing subject: career introduction, introduction of training programs, skills in writing reports, presentations, teamwork, introduction to industrial projects ... Industrial manufacturing facilities tour. Divide students into groups of 3 to implement a simple automatic device at home or practical workshops under the guidance of instructors (according to the registration plan of each group). Require students to write a report (in the form of a sub-project) and protect it before the class.

EE2000 Signals and Systems

3(3-1-0-6)

Prerequisite: MI1110 (Mathematical analysis I), MI1140 (Algebra)

Objectives: The course provides basic knowledge of signal representation, analysis and processing, modelling of linear systems which forms a basis for other courses in engineering, especially in Electrical Engineering, Control Engineering and Automation.

Contents: Definition of signals and systems, signal characteristics and classification, basic signals, system properties and classification. Signal representation and analysis in the time domain and frequency domain: real function, correlation function, spectrum density function, Fourier series, Fourier transform, Laplace transform, signal sampling and reconstruction, Z transform. Time-domain representations of linear systems: differential/difference equations, transient response, state-space models; Frequency-domain representations of linear systems: frequency response, transfer function. Introduction to modelling by experimental methods. Solve problems and do practice using Matlab.

EE2020 Electrical Circuit Theory 1

4 (3-1-1-8)
Prerequisite: MI1120 (Calculus II), PH1120 (Physics II).
Objective: Present the circuit model of electrical equipment's. Basic concepts of electrical circuits, basic methods to analyze linear circuits in steady state and transient states
Content: Provide basic knowledge of electromagnetic fields and applications for students of Electrical Engineering, including models, methods of analyzing and synthesizing linear circuits in steady and transient states.

EE2120 Electrical Circuit Theory 2

2 (2-0-1-4)
Prerequisite: EE2020 (Electrical Circuit theory I).
Objective: Guide students to study the circuit model of nonlinear elements of electrical equipment system and the model of distributed parameters.
Content: Provide students with nonlinear circuit analysis methods in steady state, sinusoidal oscillation, transient state analysis in linear circuits and study a circuit model new - distributed parameter system (long line model).

EE2030 Electromagnetics Theory

2 (2-0-0-4)
Prerequisite: MI1120 (Calculus II), PH1120 (Physics II).
Objective: Equip the most important basic technical knowledge about the model and research methods, analyze the electromagnetic field.
Content: Basic concepts of electromagnetic fields. Static electric field. The static electric field in the conductor. The static magnetic field. Variable electromagnetic field.

EE2110 Analog Electronics

3 (3-0-1-6)
Prerequisite: EE2020 (Electrical Circuit Theory I).
Objectives: Equipping learners with knowledge on: Basic electronic components, small signal equivalent models of components; Principle of amplifier circuits, amplifier analysis and design; introduction of application electronic circuits such as rectifier, DC voltage stabilizer, oscillator, comparator, active filter using op-amp.
Content: Diode and applications. Bipolar transistor and amplifier applications. Field effect transistor and amplifier applications. Amplify art and its applications. DC voltage regulator circuit. Active rectifier circuit.

EE 2130 Digital System Design

3 (3-0-1-6)
Prerequisite: EE2020 (Analog Electronics).
Objectives: Equip students with basic knowledge about digital information performance and processing in electronic devices, creating a basis for students to acquire other modules of Electrical Engineering and Automation and control Engineering programs.
Content: Digital signal representation in electronic devices, binary code and arithmetic-logic processing for binary variables. Electrical characteristics of function blocks in digital electronic devices, input and output relationships and time characteristics of digital electronic circuits. Combined logic circuits, logic sequences and theirs describe methods. Digital electronic circuit design method. Digital-analog and analog-digital signal converters.

EE3280 Control theory I

3 (3-1-0-6)
Prerequisite: EE2000 (Signals and Systems).

Objectives: Equip students with basic knowledge of system quality analysis; basic control principles (forward, feedback); design methods of linear continuous controllers in the frequency domain and in the time domain.
Content: Control continuous system in the frequency domain: describe linear system, transfer function, system quality analysis based on transfer function, frequency characteristic function. Quality evaluation criteria of the system. System control in the continuous time domain: Transfer function and state space model. Determine free state trajectories and forced state trajectories. Kinetic quality analysis; Design the state feedback controller.

EE3110 Measurement Techniques

3(3-0-1-6)

Prerequisite: EE2030 (Analog Electronics)
Objective: To provide students with basic knowledge of measurement techniques (error, the measurement range of measurement technology, processing measurement results, operation principles of equipment, constituent elements). Help students understand how to use measuring devices in production systems as well as independent working devices in laboratories. The module also provides students with the knowledge to access other modules such as process control, measurement and industrial control.
Contents:
Content of modules divided into three parts:
Part 1: Theoretical baisis of measurement techniques: the basic concept of measuring the accuracy, measurement, measuring device and measurement process (estimate the uncertainty, the operated evaluation a measuring device).
Part 2: Methods of measuring the electrical quantity, including the basic stages of the measuring device (structural indicator, conveter/transducer, comparator, communication), the universal electric quantities: current, voltage, charge current, resistance, electric feel, capacitance, frequency, phase angle difference, power and electric power.
Part 3: The methods and equipment that the nonelectric quantity. The concept of sensors and devices that constitute the great common of no electricity in industry: measuring temperature, measuring force, pressure, weight, flow, speed of the engine, move.

EE3140 Electrical Machine I

3 (3-0-1-6)
Prerequisite: EE2030 (Electromagnetic field).
Objective: Provide students with basic knowledge of electrical machines. After completing this module, students must understand the structure and working principles of electrical machines, mathematical models of the physical processes in electrical machines and the main characteristics of electrical machines.
Content: Research on: transformers, asynchronous electrical machines, synchronous electrical machines, DC motors. The content includes the structure and working principle of electrical machines, mathematical and simplified models describing the process of energy transformation, methods to determine the main parameters and characteristics of electrical machines.

EE3410 Power Electronics

3 (3-0-1-6)
Prerequisite: EE2110 (Analog electronics).
Objective:

Give students basic knowledge about the process of converting electrical energy using semiconductor capacity as well as typical application areas of power conversion. Learners will have knowledge about certain characteristics of semiconductor elements with large capacity, the process variable AC - one-way (AC - DC), AC - alternating current (AC - AC), a way - one way (DC - DC), a current - alternating current (DC - AC) and the inverter. Subjects that require the use of a simulation software such as MATLAB, PLEC, ... to study the working regime of the converter. After these subjects learners capable calculation and design of the converter in semiconductor applications simple.

Contents:

- Characteristics of the semiconductor elements: diodes, transitor, GTO, BJT, MOSFET, IGBT.
- Rectification and dependent inveter.
- The pulse voltage converter: AC, DC, DC converter
- Independent inverter: current and voltage source rectifiers.
- The concept of the frequency inverter: low frequency inverter stage DC intermediary, direct inverter
- Variable frequency resonance: inverter with current, voltage to the sin, the high frequency induction heating process.
- Method of building pulse control system has the impulse for transformation.

EE 3480 Microprocessor

3(3-0-1-6)

Objective:

Students understand the operation mechanism of control systems using the processor

Can design and build a microcontroller to solve a practical problem

Content:

Presentation principles, the structure of a driver on the program. Installing a microprocessor in most modern participation machines, students will learn through a technical circuit typical 80C51 microcontroller from Intel. Besides the knowledge of the operation mechanism of the central processing unit CPU, the rest of the program include a presentation on methods of programming in assembly language, the techniques on the

basis, of the paired basic . Thus, a processor can collect the necessary information (digital or analog), handled according to appropriate algorithms and process control as required by the problem.

EE3490 Programming Engineering

Objective: Students understand the basic programming techniques, the techniques are shown through a high-level programming language typical (C / C + +) to solve problems in science learning techniques in general and in the Electrical Engineering and Control Engineering and Automation in particular concentrate train of thinking programming and problem solving methods to achieve four basic requirements: efficiency, performance, reliability and value reuse.
Expected Results for students:

Understand the equirement basic for quality software and programming techniques in science and technology (efficiency, performance, reliability, value use).
Understanding the element basics of a software program: variables and basic data types, functions and function calls, program control structures; ability to show that the elements C and C + +.

Ability to apply basic principles in the design algorithm, design functions and library functions towards performance and value reuse
Ability to interpret and use some basic data structures and algorithms related to the different viewpoints: navigation structures, user functions and object-oriented.
Ability to select and apply thinking structured programming, object oriented programming and general programming to solve the problem simply in fact, meet the basic requirements for effective performance, reliability and value reuse.

Content: The process of software engineering and software quality requirements in science and engineering; structured programming: the basic elements of the program, algorithm design, function design and libraries, data structures, programming languages, C; object-oriented programming and general programming: abstraction, packaging data, data structures and algorithms (general) and Language C + + .

EE3425 Power Supply Systems

3(3-0-1-6)

Prerequisite: EE2020 (Electrical Circuit Theory I).

Objectives: The course provide fundamental theory about power generation, transmission and distribution, as well as the structures and working principles of medium

and low voltage network components. Students are capable of calculating, designing, planning and operating power distribution system to meet the load demand.
Content: General knowledge about power systems including economical and technical-related problems of generation, transmission and distribution systems. Medium and low voltage power network, single line diagram, measurement, control and protection circuit, device sizing, electric safety analysis, grounding and lightning protection, power quality, lighting design.

EE3242 Switchgear and Electrical Apparatus

2(2-0-1-4)

Contents: Overview of switchgear and electrical apparatus in industrial and commercial power system.
Part 1: Introduction of the basis of the theory: heating, electric arc, electromotive force, electric contact, electromagnet.
Part 2: Introduction to low-voltage, high-voltage switchgear and electric devices: structure, working principle and application in electrical systems.
Part 3: Selection and testing of switchgear and electrical apparatus in commercial and industrial power systems: fuses, disconnectors, circuit breakers, relays, magnetic contactor, high voltage and low voltage magnetic core reactor etc.,

EE 3510 Electric Drives

3(3-0-1-6)

Objective:

Provide students with the knowledge base about the process of transformation of electrical power into electrical power occur in variable speed systems. Students will deeply understand the principles of generating electromagnetic torque, how to derive the speed and torque characteristics and methods used to adjust speed of electrica drive systems in different operating modes, in presence of different load requirement. After the course,students will be able to calculate, select, integrate a electric drive system depending on various load demands

Contents:

The general issues dynamics of electric drives. Torque-speed characteristics and variable speed control. Controlled rectifier-DC motor systems. Voltage sourse-induction motor systems. Voltage sourse-Synchronous motor systems. Electric drives selection criteria.

EE 3550 Process Control

3(3-0-1-6)

Objective: Equip students with the fundamentals of process control principals, control structures, system components and properties, capability of implementing basic maths and physics principals and control theory in modelling of dynamics systems, designing

controller structure, PID controller tuning and analyzing the feedback control system for industrial plants in chemical industry, manufacturing industry and energy.

Contents: Process Control objectives, Piping &Instrumentation Diagram, Modelling of Dynamic Systems, System Identification, Design of Control Structures (feedback-, feedforward-, cascade-, ratio-, split-range-, selective control, MIMO control), PID tuning, analyzing of the feedback control systems. Typical examples are level control, temperature control, presure control, density control, flow control etc., in boilers, distilation column, heat exchanger, reactor, CSTR etc., Students have tutorials, group assignments and labs.

EE3600 Industrial Measurement and Control Systems

3(3-0-1-6)

Objective: Structure, functions and principles of operation of typical components of the industrial measurement and control systems. After learning the course, students can study, take part in the installation, operation and design of a new system.

Content: Hierarchical structure, function, and fundamental components of an industrial measurement and control systems. Measurement and signal processing devices; smart measuring devices. Actuators: electrical, hydraulic, control valves. Special control devices: PID, programmable devices (PLC, CNC). Industrial communication system: structure, HART, field bus. Human-Machine-Interface. Security and protection.

EE3810 Project 1

2(0-4-0-8)

Prerequsites: EE2120 (Electrical Circuit Theory II), EE2110 (Analog Eletronics), EE2130 (Digital Control System Design), EE3110 (Measurement Techniques), EE3280 (Control Theory I)

Objective: A student works individualy or in group on the assigned topic specialized in Control Engineering and Automation. The expected outcomes of the project I is the student's capability of implementing the solid knowledge on Analog Electronics, Digital Control system design, Measurement Techniques and Control Theory to design the specific product under the supervision of lecturers.

Content: The result of project 1 can be production simulation or the product prototype

EE3820 Project 2

2(0-4-0-8)

Prerequisites: EE3140 (Electrical Machines I)

Objective: A student works individualy or in group on the assigned topic specialized in Control Engineering and Automation. The expected outcomes of the project I is the student's capability of implementing the solid knowledge on Power Electronics, Programming Engineering, Electrical Machines and Power Supply System to design the specific product under the supervision of lecturers.

Content: The result of project 2 can be production simulation or the product prototype

EE4220 Logic Control and PLC

3(3-0-1-6)

Prerequisites: EE2130 (Digital System Design)

Objective: Equipping the student knowledge about the most common control logic of the production process, including process flow diagram, states supervision, system safety assuarance using the PLC (Programmable Logic Controler). Students learn the analyzing methos, logic control system design, harware, industrial communication network, programming with PLC.

Contents: The function of Logic control and PLC in process control; Control programming language namely LD, STL, FB, SFC complied with IEC611313. This is the systemacticaly approach to design the automated system using PLC.

Selective/Orientation Course

EE4230 Control Theory II

3(3-1-0-6)

Objective: This subject provides basic knowledge of dealing with a continuous-time linear control problem, discrete-time control problem or nonlinear control problem.

Contents: Models of discrete-time nonlinear systems. System analysis methods, the role of assessing system's performance. Controller design methods.

EE4435 Digital Control Systems

3(3-0-1-6)

Prerequsites: EE3120 (Design of a digtal systems)

Objective: Equipping students for the knowledge base digital control system, the system is embedded microcontroller. There is a brief introduction to disgital control system. The

major advanced part of digtal control system on the state space is introduced for Postgraduates program later.

Contents:

Overview of the digital control system; Considering stability of control systems; control with output feedback; control with state feedback; Perform technical control systems

EE4401 Embedded Control Systems Design

3(2-2-0-6)

Prerequsites: EE3480 (Microprocessor)

Objectives: An introduction to the architecture of embedded systems. Topics include hardware, software of embedded system, analysis, design and implementation of embedded system.

Contents:

- Embedded system architecture
- Embedded hardware
- System software
- Design and Implementation

EE4240 Electrical –Electronic Equipment of Industrial Machines

3(3-1-0-6)

Objectives:

Provide students with fundamental knowledges on tecnological properties and requirement on electrical equiment, electric drives and operating principles of industrial machines. After the course, sutdents can desgin, implement, maintain, and tuning industrial control system, electric equipment of industrial equiment.

Content: Torque-speed characteristics of metal cutting machines, conveyors, fan and pump systems. Calculating load torque, speed control range and estimating control accuracy. Canculating motor powerm, speed control devices. Analysing P&ID sketches for certain machines.

EE4423 Pneumatic and Hydraulic Systems

3(3-1-0-6)

Objectives:

Prove students with fundamental knowledeges on pneuamtic and hyraulic systems. Students also are familiar with operating principles of basic components in pneumatic and hydraulic drive systems. After the course, students will be able to design and maintain industrial pneumatic and hydraulic systems.

Content: Operating principles of compressed air and fluid in pneumatic and hydraulic systems. Control valves, pneumatic and hydraulic actuators. Pneumatic control systems.

EE4422 Microcontrollers and Applications

3 (2-1-1-6)

Prerequisite: EE2130, EE3490

Objective: Essential techniques in the design of digital systems. Concepts of hardware, software, firmware, and sequential steps in digital system design.

Content: Structure of microcontrollers. Some specific compilers and instruction sets. Peripherical systems. Digital input and output. Connection of LED, LCD and keyboard. Timer and interrupt; ADC and DAC. Communication principles (UART, SPI, I2C, CAN). Connection with PC. Examples of design. The process of design and development of microcontroller-based systems. Application examples with DC motors and robots.

EE4260 Design of Measurement Instruments

2(2-1-0-4)

Prerequsites: EE3110 (Measurement Techniques)

Objectives:

This is the basis of the direction of intensive and specialized techniques of measurement and Informatics. The course provides basic knowledge on how to design devices that basically great variety of physical, continuing knowledge of the technical measurement

Content:

Part1:Calculate the measuring device designed for the electric quantity: voltage, current, charge the ranges measured with different techniques

Part 2: Calculate the number of devices designed for measurement of common physic quantity in industry: balance weight, temperature, pressure etc.,

Some models calculate the characteristics of advanced measuring equipment.

EE 4250 Signal Processing

3(3-0-1-6)

Prerequsites: EE2000 (Signals and Systems)

Objective: Students will be equipped with the knowledge of signal and signal system continuous /discrete. The implementation of the sampling method signals continuously (similar) of a system to be implemented in digital systems, microprocessors, microcontrollers etc., Knowing how to solve mathematics analysis / synthesis system to meet the system or the parameters of the system applications of Fourier transforms, Z transform etc., first step to familiarize yourself with the concept and the filter system.

Content: Providing basic knowledge of theoretical signal continuous / discrete, signal processing continuous / discrete, theoretical signal system continuous / discrete. The Fourier transforms, Z transform of continuous signal, discrete. Overview of the window function, the filters are finite impulse response (RIF), infinite (RII), the design of filters etc.,

EE 4551 Embedded System Design

3(3-1-0-6)

Prerequsites: EE3480 (Microprocessor)

Objectives: Students understand the system knowledge of embedded systems to implement, design and apply embedded systems to solve specialized problems.

Content: The course provides students with knowledge about embedded system design. Content is developed and structured in order designed for special embedded applications for measurement applications.

EE4253 Data-Base

2(2-1-0-4)

Prerequisite subject: IT1110 (Fundamentals of Informatics)

Objective: Module provides basic knowledge on management, organization of data in industrial systems. Tell students an overview of the database; common language (SQL) and applications; of several methods to store and guarantee information security; about the software utility and messages Library database

Contents:

Curriculum "database" to provide students with basic knowledge about the standard method of storage and exploitation of information, one of the basic issues and the importance now in the information system. In the first subjects, students will be introduced to the importance and main ideas in the store and exploit information. Followed by the introduction of a structured database and SQL language. Section then

presents some problems raising the database: data structures, information security, integrated databases to applications.

EE4433: Optimization & Optimal Control

3(3-1-0-6)

Prerequisite subject: EE4230 (Control Theory II)

Objectives:

1. It enables to help student to obtain the basic and advanced knowledgement in Optimization, as well as the effectiveness of optimization application in finding the optimal parametters of Controller, Model Parametter Identification, Optimal Observer, uncertainties Compensator.
2. Student learn how to solve optimal control problem, find the appropriate control input.
3. Student need to known the principle, control objective of optimal control and how to find the robust control.

Contents: Classify the Optimization and Optimal Control Problem. Optimization (Linear and Nonlinear). Optimization Methods consist of Variational Method, Dynamic Programming, Maximum Principle.

EE4440 Control System Design

3(3-1-0-6)

Prerequisite subject: EE4230 (Control Theory II)

Objective: Provide students' methods and skills of using modern tools to carry out design steps of control system and verify results in application-based approach.

Contents: Control design methods on time domain: State feedback control, state observer, non-linear control system, optimal and robust control, Model Predictive Control (MPC). Modelling and Simulation using Matlab/Simulinks

EE4439 Control of Mechanical-Electrical Systems

4(4-0-1-8)

Objective:

Provide fundamental control solutions and the development history of Mechatronic Field which are employed in modern systems such as Robot, unmanned vehicle, unmanned arieal vehicle,

Contents:

1. The Survey of Application in Mechatronic Systems.
2. How to find the model of Mechatronic Systems.
3. The Diagram of Control Systems;

4. Robust Adaptive Control for manipulators;
5. Nonholonomic/Holonomic Constraint Description in Robotic Systems.

Passivity based control for mechatronic systems.

EE4420 Fuzzy Control and Neural Network

3(3-0-1-6)

Objective: Provide for student's uncertain information processing methods and skills of using fuzzy implication tool, practical approximation technique in analysis, design of control system with incorrect plant's model.

Contents: Basic and advanced fuzzy logic, procedure for fuzzy controller design, fuzzy logic toolbox for implementation and simulation. Basic neural network structures and operating principle, neural network training methods, information approximation based on neural networks in control, fuzzy-neural controller design.

EE4438 Project for Control System Design

2(0-0-4-4)

Prerequisites subject: EE4434 (Control System Design II)

Objective: Students practise methods and skills of dealing with control system design which satisfies practical requirements, concurrently practise professional skills such as foreign language, communication and working in group.

Contents: One project with 3 to 4 students given by instructor or students' proposal. Students are required to study documents, determine design requirements, choose design method, implement the design and verify it through simulation or experiments, write report and defend.

EE4241 Power Supply System for Buildings

3 (2-1-1-6)

Prerequisite: EE3420 (Power Supply System)

Objective: To provide learners with knowledge about power distribution systems and analysis, design calculations and operation of power supply systems for buildings.

After this subject, learners will know how to calculate, design and operate, control the power supply system for buildings

Content: Overview of IEC standards for building power system. Power supply diagram, Calculation of economic and technical targets when designing and operating the power

supply system of the building. Calculation and selection of electrical distribution, protection and control devices in the building. Electrical safety for the building. Lightning protection for buildings. Calculation of lighting for buildings. The connection of BMS building management control system. Use software to support the calculation of power supply and lighting design.

EE4340 Specialized Project (Specialized in Industrial Automation)

2 (0-0-4-4)

Prerequisites: EE3410 (Power Electronics), EE3510 (Electric Drive)

Objective:

This specialized project facilitates students to carry out a technical design task with a guidance. The project requires students to combine the use of knowledge of many previous basic subjects to solve a relatively complete task but on a small scale. Students are allowed to choose topics in a set of pre-defined topics. Each topic requires general knowledge but also has a clear orientation**.**

Content:

Gathering a number of topics with professional orientation is relatively clear for students to choose.

- Indicate the requirements of the steps that the implementer must follow.
- Request for submission of a design project

EE4336 Design of Power Electronic Control System

3(3-1-0-6)

Prerequisites: EE3410 (Power Electronics)

Objectives: Design a power electronic control system from solution selection to device level. Students will be able to design the system for a certain application.

Contents: General requirement and function of a power electronic control system. System formulating and designing process. Phase control of rectifiers and AC control. Control system of voltage and current inverter: pulse width modulation, applications of microcontrollers . DC-DC converters. Examples of design process.

EE4341 Robot Engineering

3(3-1-0-6)

Objectives: The course provide students fundamental knowledges on robots and industrial robots, students will have an ability to design robot control system in accordace with advanced automted systems.

Contents: Robot structure, forward and inverse kinematics, kinetic. Trajectory design. Motion and force control systems. Actuators and sensors.

EE4300 Computer Data Acquisition and Control

3(3-1-0-6)

Objectives: Help students understand main techniques in design a data acquisition and control with computer via RS232, USB ports and other peripherant.

Contents: Introduction to computers, measument and control using computers. Design and develop application programs. Human Machine Interface (HMI). Computer data acquisition and control system design.

EE 4316 Modelling and Simulation

2(2-1-0-4)

Objective: Presentation on the concept of modeling and simulation elements and systems. Applicability tool modeling and simulation analysis and design system. **Contents:** Part 1: Modeling of the plants and control systems. Part 2: Simulation and tools specialized for Control Engineering and Automation. Basic skills for design and do research base on modelling and simulation with typical tools; analize and verify the results

EE4513 Industrial Management

2(2-1-0-6)

Objective: Equip students fundamentals of management, manufacturing management, sales, quality, human resoursces, finance and investment; analytic tools, simulation, evaluation support for decision making of manufacturing and management.

Contents: Management; manufacturing management, sales, quality, human resources, finance and investment; Project management, Information organization methodologies

for supporting manufacturing and management process; Total manufacturing integrated models.

EE4231 Industrial Maintenance

3(3-1-0-6)

Prerequisites: EE3155 (Power Supply system), EE3140 (Electric Machine)

Objective: To provide students with an overview of industrial maintenance, to be able to measure, monitor, calculate and develop periodic maintenance of the working regime of each machine, each workshop as well as whole machines in the factory. In addition, students are provided with the ability to diagnose the symptoms of malfunction as well as plan to manage or repair broken or potentially damaged items. Students know how to ensure that the equipment in the plant is always running smoothly according to the schedule planned by the production department.

Content: Overview of industrial maintenance. Planning and industrial maintenance schedule. Cost assessment and maintenance control. Equipment used in industrial maintenance. Maintenance of electrical equipment and mechanical equipment. Maintenance of equipment in the factory.

EE4530 Computer Integrated Manufacturing Systems

3(3-0-0-6)

Objectives: Equip students the fundamentals of Automated Production System, which is composed of machines, human and, technological process to provide products in accordance with market demand. After the course, students will be able to analyse production systems, cooperate the system available functions to ensure the production target

Contents: Concepts of automated production systems and their properties. Principles and automated strategies. Concepts of production systems. Automation and control engineering. Digital control system. Industrial robots. Discrete control using PLC and PC. Transpotation and warehouse; autonomous car; Quality control; manufacturing support systems.

EE4540 CNC control

2(2-1-0-4)

Objectives: Providing students with fundamentals of the CNC machine, interpolation schemes and program compilers. After the course students will be able to design, maintain and operate CNC systems

Contents: Introduction to CNC. CNC control program structure. Interpolation. Control kernel structure. Open structure of CNC systems. Control system design of the CNC Machine

EE4531 Biomedical and environmental measuring equipment

3 (3-1-0-6)

Objective: Students are provide with basic knowledge of measuring and environment testing of water and gas and medical devices. Contributing to raising awareness of environmental pollution in Vietnam. The module provides students with specific criteria or standards to assess the pollution level of waste sources. Provide anymethods and technologies to treat gas and water environments.

Content: Overview of medical measuring equipment and environmental testing. Biochemical measuring equipment, material concentration analysis. Equipment through biological stream. Measuring devices and organ exploration. Measuring device and monitoring physiological constant. Overview of environmental pollution in Vietnam. Concept and classification of environmental monitoring and monitoring systems. Technology for measuring and checking air pollutants. Technology for measuring and examining water pollutants. Environmental treatment methods.

EE4550 High-speed network and communication network

3 (3-1-0-6)

Prerequisites: EE3600 (Industrial Measurement and Control Systems)

Objective:

The course provides for students with basic knowledge of computer network system based on

OSI model such as physical transmission, network structure, MAC etc., and protocols used on the

system Networks such as HDLC, PPP, TCP / IP as well as services used on DSN and FTP

networks. After studying this subject, students have enough knowledge to develop and program

online applications.

Content: Physical link and connection registration protocols such as HDLC, PPP. LAN network. TCP / IP protocol and Frame Relay networks, ATM. Applications www, DSN, FTP, Telnet etc.,

EE4502 Sensor and Transducer

3 (3-1-0-6)

Objective: To provide students with basic knowledge of sensors like Principle of convertor, conditioning circuits of sensors. Criteriesfor selection of sensors and design some sensors toused in measurement and control system.

Content: The concept of sensors. Resistive sensor. Electromagnetic sensors. Electrostatic sensor. Energyautonomous sensor (haverting sensors). Some other sensors. Smart sensors

EE4500 Specialized Project (Measurement and Industrial Informatics)

2 (0-0-4-4)

Prerequisites: EE3600 (Industrial Measurement and Control Systems), EE3490 (Programming Engineering), EE4152 (Data-base), EE4110 (Logic Control and PLC)

Objective: This specialized project facilitates students to carry out the technical tasks. The project requires students to combine the use of knowledge of many previous basic subjects to solve a relatively tasks but on a small scale. Students are allowed to choose topics in a set of pre-defined topics assigned by their teachers. Each topic requires general knowledge but also has a clear orientation.

Content: Students are divided into groups of 1-3 people. Students will select one of profession orientation topics. Supervisors specify the required implementsteps.

EE4515 Computer Structure

2 (2-1-0-4)

Prerequisites: EE3480 (Microprocessor)

Objective: Provided to students the structure and principles of computer operations. Learning computer design methods. Understand advanced computer structures.

Content: Organize computer system. Nummerical logic level. Micro level program. Conventional machine. Operating system level. Language assembly. Advanced computer structure.

EE4514 Technical English

2(2-0-0-4)

Objectives: Providing the students technical vocabulary and guidance to reading comprehensive, literature review, synthesis specialized in Control Engineering and Automation; guidances to technical writing and group discussion

Contents: fast sorting the relevant disciplined literatures in English from library and internet; reading comprehensive and translation; content summarizing and scientific research topic presentating; teamwork

EE4525 Micro system

2 (2-0-0-4)

Prerequisites: EE3110 (Measurement Techniques)

Objective: This module helps students understand the micro-system technology, the most modern technology; the applications of the micro-systems in measurement and control.

Content: General concept of micro-systems, and classification. Basic technologies of micro-system fabrication. Specific micro systems: Micro communication system; Camera and digital camera; Micro sensor (accelerometer); Digital spectrometer; Biosensor; Microelectromechanical structure

EE4527 FPGA Technology and VHDL language

2 (2-1-0-4)

Prerequisites: EE3490, EE3480 (Microprocessor Engineering)

Objective: This module introduces new technologies in electronic engineering. Through lectures students have the new trend in designing and manufacturing electronic devices; From there, it is possible to analyze, design, exploit and use analog and digital electronic devices using FPAA and FPGA programming chips.

Content: FPAA technology: The problem of electronic circuit design, difficulties and limitations in circuit design according to traditional technology. Technique using

switched capacitor, FPAA IC and special features, AnadigmDesigner circuit design software. Some design and application examples of FPAA.

FPGA technology: Microchip programmable logic and development steps. Special features and applications of FPGAs in the design of digital electronics. Digital electronics design process. Programming language that describes VHDL hardware and applications. Some examples of digital electronic circuit design using FPGA IC and VHDL language.

EE4528 Advanced measurement

2 (2-1-0-4)

Prerequisites: EE3110 (Measurement Techniques)

Objective: To provide students with advanced processing methods in measuring and monitoring techniques and modern equipment.

Content: Principles, methods of design and advanced data processing apply to various types of devices: digital oscilloscope, spectrum analyzer, smart measuring device and virtual devices.

EE4524 Non-destructive testing and measurement

2 (2-0-0-4)

Objective: To help students understand the basic principles of non-destructive testing and measurement methods: objects and modern measuring systems and devices used in industries such as aviation , Oil and Gas.

Content: Basic principles of measurement and non-destructive testing. Non-destructive measurement and testing methods: Optical method, osmosis method, flux loss method, eddy current method (Foucault), Radiation method, Ultrasonic method, Method high frequency waves.

EE4312 Industrial Robots

2(2-1-0-6)

Objectives: Provide several robot strustures, formulate forward and inverse kinematics. Student have a solid knowledges on robot join actuators and control board using microcontrollers.

Contents: Modelling and Control of Industrial Robots; Forward and inverse kinematics; Solving inverse kinematic problems; Sensors and actuators; Software and hardware for industrial robots

EE5020 Graduate Project for Engineer

12(0-0-12-24)

Prerequisite: EE4433, EE4445

Objective: Students practice their ability of applying the overall learnt knowledge and skills from the program to detect and deal with a theory problem or applications belong to the area of automatic control, improve their research abilities, design or carry out a control system or automation system in the context of economics and society.

Contents: One project with 2 to 3 students given by instructor or students' proposal. Students are required to study documents, determine design requirements, choose design method, implement the design and verify it through simulation or experiments, write report and defend.

EE5200 Pre-Graduation Internship

3(0-0-6-6)

Objectives: Students have chance to entering the real workplaces, step by step learn and solve the real problem which can relevant to the bachelor thesis topic

Content: Student has the right to choose the proper topic and supervisor, the earn work experience and attitude in the workplace that close to the Control Engineering and Automation disciplines. The workplaces are factories, enterprises or research institutes. The outcomes of the course are the internship report and presentation

EE3910 Technical Practicum

2(0-0-4-4)

Objectives: Students have chance to entering the real workplaces, get to know the work environment that relevant to Electric Engineering/ Control Engineering and Automation.

Content: The third year students are sent to professional workplace to do technical practicum. Base on the real ongoing project at the workplace, students learn to solve the real problem from easy to difficult tasks. The technical practicum takes 4 weeks. Students are encouraged to find the workplaces by themselves or with the support of the school. The outcomes of the course are the internship report and presentation