Study Plan: Electrical Engineering

First year student (First semester)

Code	Subject	Credits
		(Theory-Laboratory-Self learning)
010403096	การโปรแกรมคอมพิวเตอร์ (Computer Programming)	3(2-2-5)
04xxxxxxx	วิชาเลือกในกลุ่มวิชาวิทยาศาสตร์และคณิตศาสตร์ (Science and Mathematics Elective Course)	3(x-x-x)
040203111	คณิตศาสตร์วิศวกรรม 1 (Engineering Mathematics I)	3(3-0-6)
040313005	ฟิสิกส์ 1 (Physics I)	3(3-0-6)
040313006	ปฏิบัติการฟิสิกส์ 1 (Physics Laboratory I)	1(0-2-1)
080103001	ภาษาอังกฤษ 1 (English I)	3(3-0-6)
08xxxxxxx	วิชาเลือกในกลุ่มวิชาพลศึกษา (Physical Education Elective Course)	1(x-x-x)
08xxxxxxx	วิชาเลือกในกลุ่มวิชาสังคมศาสตร์และมนุษยศาสตร์ (Social Sciences and Humanities Elective Course)	3(x-x-x)
	Total	20(x-x-x)

First year student (Second semester)

Code	Subject	Credits (Theory-Laboratory-Self learning)
010153101	ดิจิทัลและไมโครโพรเซสเซอร์เบื้องต้น (Digital and Microprocessor Fundamentals)	3(3-0-6)
010153102	ทฤษฎีวงจรไฟฟ้า (Electric Circuit Theory)	3(3-0-6)
040113001	เคมีสาหรับวิศวกร (Chemistry for Engineers)	3(3-0-6)
040113002	ปฏิบัติการเคมีสาหรับวิศวกร (Chemistry Laboratory for Engineers)	1(0-3-1)
040203112	คณิตศาสตร์วิศวกรรม 2 (Engineering Mathematics II)	3(3-0-6)
040313007	ฟิสิกส์ 2 (Physics II)	3(3-0-6)
040313008	ปฏิบัติการฟิสิกส์ 2 (Physics Laboratory II)	1(0-2-1)
080103002	ภาษาอังกฤษ 2 (English II)	3(3-0-6)
	Total	20(x-x-x)

Second year student (First semester)

Code	Subject	Credits (Theory-Laboratory-Self learning)
010153104	อิเล็กทรอนิกส์ (Electronics)	3(3-0-6)
010153105	เทคนิคการวิเคราะห์วงจร (Circuit Analysis Technique)	3(3-0-6)
010153601	ปฏิบัติการทางวิศวกรรมไฟฟ้า 1 (Electrical Engineering Laboratory I)	1(0-3-1)
010403097	สถิตยศาสตร์วิศวกรรม (Engineering Statics)	3(3-0-6)
010403098	วัสดุวิศวกรรม (Engineering Materials)	3(3-0-6)
040203211	คณิตศาสตร์วิศวกรรม 3 (Engineering Mathematics III)	3(3-0-6)
0xxxxxxxx	วิชาเลือกในหมวดวิชาศึกษาทั่วไป (General Education Elective Course)	3(x-x-x)
08xxxxxxx	วิชาเลือกในกลุ่มวิชาพลศึกษา (Physical Education Elective Course)	1(x-x-x)
	Total	20(x-x-x)

Second year student (Second semester)

Code	Subject	Credits) Theory-Laboratory-Self learning)
010153103	ทฤษฎีแม่เหล็กไฟฟ้า (Electromagnetic Theory)	3(3-0-6)
010153201	การวัดทางไฟฟ้าและเครื่องมือวัด (Electrical Measurement and Instrumentation)	3(3-0-6)
010153301	เครื่องจักรกลไฟฟ้า 1 (Electrical Machines I)	3(3-0-6)
010153602	ปฏิบัติการทางวิศวกรรมไฟฟ้า 2 (Electrical Engineering Laboratory II)	1(0-3-1)
010403099	การเขียนแบบวิศวกรรม (Engineering Drawing)	3(2-2-5)
0xxxxxxxx	วิชาเลือกในหมวดวิชาศึกษาทั่วไป (General Education Elective Course)	3(x-x-x)
08xxxxxxx	วิชาเลือกในกลุ่มวิชาภาษา (Language Elective Course)	3(x-x-x)
0xxxxxxxx	วิชาเลือกในหมวดวิชาศึกษาทั่วไป (General Education Elective Course)	1(x-x-x)
	Total	20(x-x-x)

Third year student (First semester)

Code	Subject	Credits (Theory-Laboratory-Self learning)
010153001	วิทยาศาสตร์อุณหภาพ (Thermal Sciences)	3(3-0-6)
010153302	เครื่องจักรกลไฟฟ้า 2 (Electrical Machines II)	3(3-0-6)
010153303	อิเล็กทรอนิกส์กาลัง (Power Electronics)	3(3-0-6)
010153401	การออกแบบระบบไฟฟ้า (Electrical System Design)	3(3-0-6)
010153402	การผลิต การส่ง และ การจาหน่ายไฟฟ้า (Electrical Power Generation, Transmission and Distribution)	3(3-0-6)
0101535xx	วิชาชีพเลือกทางวิศวกรรมไฟฟ้า (Profession Electrical Engineering Elective Course)	3(x-x-x)
010153603	ปฏิบัติการทางวิศวกรรมไฟฟ้า 3 (Electrical Engineering Laboratory III)	1(0-3-1)
	Total	19(x-x-x)

Third year student (Second semester)

Code	Subject	Credits
		) Theory-Laboratory-Self learning)
010153202	วิศวกรรมควบคุม (Control Engineering)	3(3-0-6)
010153203	ระบบอัตโนมัติในอุตสาหกรรม (Industrial Automation Systems)	3(3-0-6)
010153403	การวิเคราะห์ระบบไฟฟ้ากาลัง (Power System Analysis)	3(3-0-6)
010153404	ระบบผลิตไฟฟ้าแบบกระจาย (Distributed Generation Systems)	3(3-0-6)
0101535xx	วิชาชีพเลือกทางวิศวกรรมไฟฟ้า (Profession Electrical Engineering Elective Course)	3(x-x-x)
010153604	ปฏิบัติการทางวิศวกรรมไฟฟ้า 4 (Electrical Engineering Laboratory IV)	1(0-3-1)
010153605	ปฏิบัติการเฉพาะทางวิศวกรรมไฟฟ้า (Specific Laboratory in Electrical Engineering)	1(0-3-1)
0xxxxxxxx	วิชาเลือกในหมวดวิชาศึกษาทั่วไป (General Education Elective Course)	3(x-x-x)
	Total	20(x-x-x)

Fourth year student (First semester)

Code	Subject	Credits (Theory-Laboratory-Self learning)
010153606	สัมมนาทางวิศวกรรมไฟฟ้า (Electrical Engineering Seminar)	1(0-2-1)
010153701	โครงงาน 1 (Project I)	3(0-6-3)
0101539xx	วิชาเลือกทางวิศวกรรมไฟฟ้า (Electrical Engineering Elective Course)	3(x-x-x)
0101539xx	วิชาเลือกทางวิศวกรรมไฟฟ้า (Electrical Engineering Elective Course)	3(x-x-x)
xxxxxxxxx	วิชาเลือกเสรี (Free Elective Course)	3(x-x-x)
	Total	13(x-x-x)

Fourth year student (Second semester)

Code	Subject	Credits (Theory-Laboratory-Self learning)
010153702	โครงงาน 2 (Project II)	3(0-6-3)
0101539xx	วิชาเลือกทางวิศวกรรมไฟฟ้า (Electrical Engineering Elective Course)	3(x-x-x)
08xxxxxxx	วิชาเลือกในกลุ่มวิชาภาษา (Language Elective Course)	3(x-x-x)
xxxxxxxxx	วิชาเลือกเสรี (Free Elective Course)	3(x-x-x)
	Total	12(x-x-x)

Bachelor of Engineering Program

in Electrical Engineering (English Program)

010153001 Thermal Sciences **3(3-0-6)**

Fundamental concepts of thermodynamics, fluid dynamics, combustion and heat transfer, law of thermodynamics, ideal gas law, fluid mechanics, combustion, heat transfer, steady flow devices, refrigeration cycles, internal and external flows.

010153101 Digital and Microprocessor Fundamentals **3(3-0-6)**

Introduction to the digital signal, number systems and codes, digital circuits, logic gates and boolean algebra, integrated cpircuit, logic families (TTL, CMOS) , timing diagram, state diagram and implementation, microprocessor and microcontroller architecture, register and memory, basic input/ output, interrupt, basic I/ O application, timer/ counter, analog to digital conversion, serial Interface, C programming.

010153102 Electric Circuit Theory **3(3-0-6)**

Circuit elements; resistance, inductance, and capacitance; Kirchhoff's laws, node and mesh analysis, circuit theorems, source transformations, linearity and superposition, Thevenin' s and Norton' s theorem, first and second order circuits, phasor concept, phasor diagram, AC power circuits, three phase systems.

010153103 Electromagnetic Theory **3(3-0-6)**

Electrostatic fields, conductors and dielectrics, capacitance, convection and conduction currents, magnetostatic fields, inductance, time-varying electromagnetic fields, Maxwell's equations, introduction to plane wave.

010153104 Electronics **3(3-0-6)**

Semiconductor devices, device current-voltage and frequency characteristics, analysis and design of diode circuits, analysis and design of BJT and MOS transistor circuits, operational amplifier and its applications, amplifiers, oscillators, power supplies, power electronic devices.

010153105 Circuit Analysis Technique **3(3-0-6)**

Complex frequency, transfer function, frequency response, parallel and series resonance, bode diagrams, Mutual inductance, linear and ideal transformer, twoport networks, Fourier series, Fourier transform and Laplace transform.

010153201 Electrical Measurement and Instrumentation **3(3-0-6)**

Units and standard of electrical measurement, instrument classification and characteristics, shielding and safety, measurement analysis, measurement of dc and ac current and voltage using analog and digital instruments, power, power factor, and energy measurement, the measurement of resistance, inductance, and capacitance, frequency and period/time interval measurement, noise, transducers.

010153202 Control Engineering **3(3-0-6)**

Mathematical models of systems, closed-loop and open-loop control systems, transfer function, signal flow graphs, time-domain and frequency-domain analysis and design of control systems, root locus, Nyquist plots, Bode plots, system stability.

010153203 Industrial Automation Systems **3(3-0-6)**

Industrial control, analog signal conditioning, digital signal conditioning, sensors and transducers, analog controllers, digital controllers, sequence control, programmable logic controllers (PLC), PLC programming, PLC interfaces, PLC applications in automation systems.

010153301 Electrical Machines I **3(3-0-6)**

Magnetic circuits, principles of electromechanical energy conversion, energy and co-energy, single phase and three phase transformer, auto transformer, equivalent circuit of transformer, principles of rotating machines, DC machines, equivalent circuit of DC machines, performance of DC machines, DC motor speed control and protection.

010153302 Electrical Machines II **3(3-0-6)**

AC machines construction, synchronous speed, rotating magnetic field, synchronous machines, equivalent circuit of synchronous machines, steady-state power angle characteristics of synchronous machines, synchronous condenser, single phase and three phase induction machines, equivalent circuit of induction machines, protection of machines.

010153303 Power Electronics **3(3-0-6)**

Characteristics of power electronics devices, power diode, thyristors, power bipolar, MOSFET, IGBT, characteristics of magnetic material, power transformer core, ferrite core, iron powder core, converters, ac to dc converter, dc to dc converter, ac to ac converter, dc to ac converter.

010153401 Electrical System Design **3(3-0-6)**

Basic design concepts, codes and standards, power distribution schemes, electrical wires and cables, raceways, electrical equipment and apparatus, load calculation, power factor improvement and capacitor bank circuit design, lighting and appliances circuit design, motor circuit design, load, feeder, and main schedule, emergency power systems, short circuit calculation, co-ordination of protective devices, grounding systems for electrical installation.

010153402 Electrical Power Generation, Transmission and Distribution) **3(3-0-6)**

Power system structure, sources of electric energy, conventional and renewable energy power plants, load characteristics, generator characteristics and models, power transformer characteristics and models, transmission line parameters and models, electrical power distribution systems, introduction to distributed generation, power system equipment.

010153403 Power System Analysis **3(3-0-6)**

Transmission and distribution networks calculation, load flow, load flow control, symmetrical short circuit analysis, unsymmetrical short circuit analysis, power system stability, economic operation.

010153404 Distributed Generation Systems **3(3-0-6)**

Distributed generation, technologies of DG, conventional and renewable technologies, grid interconnection, technical impact of distributed generation on distribution systems, loss, voltage profile, reliability, protection, load flow, smart grids, economics aspects.

010153501 Power System Protection **3(3-0-6)**

Fundamental of protection practices, instrument transformer and transducers, protection devices and protection systems, overcurrent and earth fault protection, differential protection, transmission line

protection by distance relaying, transmission line protection by pilot relaying, motor protection, transformer protection, generator protection, bus zone protection.

010153502 High Voltage Engineering **3(3-0-6)**

Uses of high voltage and over voltage in power systems, generation of high voltage for testing, high voltage measurement techniques, electric field stress and insulation techniques, breakdown of gas, liquid and solid dielectrics, high voltage testing techniques, insulation coordination.

010153511 Renewable Energy **3(3-0-6)**

Energy systems and renewable energy resources, potential of renewable resources in Thailand, difference of conventional and renewable energy technologies, renewable technologies, solar, wind, biomass, geothermal, biogas, municipal solid waste, wave energy, fuel cell, energy storages, laws, regulations, and policies of renewable energy, economics aspects.

010153512 Energy Conservation and Management **3(3-0-6)**

Fundamental of energy efficiency, principle of energy efficiency in building and industry, load management, laws and regulations of energy conservation, energy management and analysis in building and industrial, technical aspects to use energy efficiently in lighting systems, heating and ventilating and air-conditioning (HVAC) systems, industrial motor, co-generation, energy onservations and management measures and economics analysis.

010153521 Microprocessors **3(3-0-6)**

Introduction to microprocessors, structure of microprocessors, assembly programming, interface techniques, memories, input-output interfaces, applications of microprocessors in instrumentation systems, applications of microprocessors in automation systems.

010153522 Process Instrumentation **3(3-0-6)**

Measurement and control devices, analog and digital transducers, pressure measurement techniques, differential pressure transmitter, fluid flow measurement includes primary meters, secondary meters and special methods, measurement of temperature includes non-electric methods, electric methods and radiation method, types of liquid level measurement, direct liquid level measurement, indirect liquid level measurement includes hydrostatic pressure methods, electrical methods and special methods, conventional controller.

010153601 Electrical Engineering Laboratory I **1(0-3-1)**

Basic experiments in electrical engineering relating to electric circuits and digital circuits.

010153602 Electrical Engineering Laboratory II **1(0-3-1)**

Basic experiments in electrical engineering relating to electronic citcuits, electrical instruments and measurements, computer simulation packages in electrical engineering.

010153603 Electrical Engineering Laboratory III **1(0-3-1)**

Basic experiments in electrical engineering relating to electrical machines, electrical machine drives and power electronic circuits.

010153604 Electrical Engineering Laboratory IV **1(0-3-1)**

Basic experiments in electrical engineering relating to electrical system design and electrical power system circuits using computer simulation packages.

010153605 Specific Laboratory in Electrical Engineering **1(0-3-1)**

Basic experiments in electrical engineering relating to profession electrical engineering elective courses.

010153606 Electrical Engineering Seminar **1(0-2-1)**

Method to write academic articles and bachelor degree project, method to present the seminar project for new or current interesting subject in electrical engineering, also a visiting speaker may give a talk in electrical engineering aspects, onsite activities observation in electrical engineering.

010153701 Project I **3(0-6-3)**

Students work either individually or in groups proposes the project title to their advisors or the advisors will give the project title to them. The project title must be an interesting subject in the field of electrical engineering for the time being. Students must study to find out solution for their selected project. Report of this study will be presented to their advisors.

010153702 Project II **3(0-6-3)**

Continuation and the completion of the project initiated in 010153701 course.

010153801 Preparation for Overseas Training **3(3-0-6)**

This course provides detailed information and pre-departure activities to get ready before attending practical training abroad, helpful information of foreign countries is introduced in order to be well-prepared in overseas training, social communities, culture, environment, traveling and daily- life.

010153802 Overseas Training **6(0-360-0)**

This course offers practical experience applying electrical engineered training abroad in a setting organization which is governmental bureau or private agency, such an organization needs to get approval of department and the program of a semester in duration is satisfied, final report for the profession of practical training abroad is required to get evaluation of the department. Grades given in the course completed under enrollment is on S-U system.

010153901 Selected Topics in Electrical Engineering I **3(3-0-6)**

Topics of current interest in Electrical Engineering.

010153902 Selected Topics in Electrical Engineering II) **3(3-0-6)**

Topics of current interest in Electrical Engineering.

010153903 Selected Topics in Electrical Engineering III **3(3-0-6)**

Topics of current interest in Electrical Engineering.

010153904 Communication Engineering Systems 3(3-0-6)

Signal and systems, spectrum of signal and applications of Fourier series and transform, analog modulation, AM, DSB, SSB, FM, NBFM, PM, noise in analog communication, binary baseband modulation, Nyquist's sampling theory and quantization, pulse analog modulation, pulse code modulation (PCM), delta modulation (DM), multiplexing, time-division multiplexing (TDM), introduction to transmission lines, radio wave propagation, microwave components and satellite communications, and optical communications.

010153905 Computer Networks 3(3-0-6)

Computer networking components, various network architectures, communication protocols, standards of wired and wireless technologies in computer networks, routing in data networks, congestion control, network design specifications, applications of information networks for data, voice and video communications, data security, performance analysis of computer networks.

010153906 Industrial Management 3(3-0-6)

The structure of organization and the industrial system, product development and demand forecasting, plant engineering and physical facilities planning, industrial safety and production standard, production planning and control, quality planning and control, material management, budgetary and cost control, marketing management.

010153907 Engineering Economics 3(3-0-6)

Basic concepts in engineering economic, cost concepts based on activity and quality, time value of money, measurement of investment comparison of alternatives, depreciation and income tax consideration, replacement analysis, decision making under risk and uncertainty, break-even analysis.

010153908 Nuclear Energy 3(3-0-6)

Nuclear physics, nuclear reactions, nuclear reactor and nuclear power, advantages and disadvantages of nuclear power, nuclear bombs and nuclear fusion. At the end of the course, there is a seminar on those topics.

010153909 Electric Drives 3(3-0-6)

Electric drive components, load characteristics, operating region of drives, braking methods of motors, power transmission and sizing, torque-speed characteristics of electric motors, types of controllers, DC motor drives, AC motor drives, servo drives systems, applications of drives in industrial automations.

010153910 Power System Harmonics **3(3-0-6)**

Prerequisite : None

Harmonics, harmonic sources, harmonic calculation, effects of harmonic, harmonic standards, harmonic measurement and problems of harmonic.

010153911 Research Methodology **3(3-0-6)**

Research topic selection, topic analysis and solution, primary experiment and solution test design, circuit analysis and simulation by using computer, statistics for data analysis, final analysis solution and circuit test, final result summarization, presentation and paper writing, case study and seminar.

010153912 Power Plant and Substation **3(3-0-6)**

Load curve; diesel power plant; steam power plant; gas turbine power plant; combined cycle power plant; hydro power plant; nuclear power plant; renewable energy sources; type of substation; substation equipment; substation layout; lightning protection; grounding systems.

010153913 Control Theory **3(3-0-6)**

State-space representation for continuous-time and discrete-time control systems; observability, stability and controllability; introduction to optimal control systems and calculus of variation; maximum principle; dynamic programming.

010403096 Computer Programming **3(2-2-5)**

Computer concepts, computer components, hardware and software interaction, EDP concepts, program design and development methodology, high-level language programming.

010403097 Engineering Statics **3(3-0-6)**

Classification of engineering mechanic, state and behavior of body in engineering statics, system and resultant of forces acting to body, resultant and resolution of forces: equilibrium, analysis of simple structures, centroid and center of gravity of body, friction force, truss stcture, moment of inertial of an area, virtual work and stability.

010403098 Engineering Materials **3(3-0-6)**

Study of relationship between structures, properties, production processes and applications of main groups of engineering materials i.e. metals, polymers, ceramics and composites, phase equilibrium diagrams and their interpretation, mechanical properties and materials degradation.

010403099 Engineering Drawing **3(2-2-5)**

Basic drawing design and drawing standards, orthographic projection, orthographic and pictorial drawings, dimensioning and tolerancing, sections, auxiliary views and development, freehand sketches, detail and assembly drawings, development of surfaces, basic computer-aided drawing, introduction to electrical and electronics drawing