

International Undergraduate Program
Faculty of Engineering, Kasetsart University

Second Semester

| Course ID | Course Name | Credit | Date / Time |
|------------------|--|---------------|--------------------|
| 01205201 | Introduction to Electrical Engineering | 3 | Tue / Thu 16–17.30 |

Course Description

Direct current and alternating current circuit analysis. Generators and their uses. Motors and their uses. Transformers. Three-phase systems. Power transmission system. Electrical instruments.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|-------------------------------------|---------------|--------------------|
| 01205202 | Electrical Engineering Laboratory I | 1 | (Lab) Fri 16–19 |

Course Description

Laboratory experiments on topics covered in introduction to Electrical Engineering.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|-----------------------------|---------------|--------------------|
| 01205211 | Electric Circuit Analysis I | 3 | Fri 9–12 |

Course Description

Definitions. Basic concepts and units. Circuit elements. Resistive circuits. Dependent sources. Circuit theorem and analysis. Node and mesh analysis. Network theorem. Graph theory. Energy storage elements. First order and second order circuits. Sinusoidal signal. Phasor diagram. Alternating current steady-state analysis. AC power circuits. Three-phase circuits.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|--|---------------|--------------------|
| 01205213 | Electronics and Electrical Engineering Lab | 1 | Wed 9-12 |

Course Description

Laboratory experiments about Ohms' law. Kirchhoff's law. Equivalent circuit. Electrical power. Transient response. Steady state response. Filter. Diode. Rectifier. Voltage regulator. Transistor. Transistor amplifier. Op-amp circuit.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|---|---------------|--------------------|
| 01205214 | Electrical Machines Laboratory&Electrical Practices | 1 | Thu 13-16 |

Course Description

Laboratory on electric generators. Motors. Transformers. 3-phase circuits. Electrical installation. Grounding. Electrical safety.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|---------------------|---------------|--------------------|
| 01205216 | Signals and Systems | 3 | Tue / Thu 10.30–12 |

Course Description

Continuous-time signals. Linear and time-invariant systems. Fourier series. Fourier transform. Power spectral density and signal bandwidths. Modulations and bandpass signals. Frequency division multiplexing. Transfer functions of communication channels. Discrete-time signals. Sampling theorem. Time division multiplexing. Laplace and Z transform. Solutions of differential and difference equations using transforms.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|----------------------------------|---------------|--------------------|
| 01205217 | Electromagnetic Fields and waves | 3 | Mon / Wed 16–17.30 |

Course Description

Vector analysis. Electrostatic fields. Potential and energy. Conductors and dielectric. Capacitance. Convection and conduction currents. Resistance. Solution of Laplace's and Poisson's equations. Magneto static fields. Magnetic materials. Inductance. Displacement current. Time-varying electromagnetic fields. Maxwell's equations.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|---|---------------|--------------------|
| 01205218 | Electrical Measurements and Instruments | 3 | Mon / Wed 9–10.30 |

Course Description

Units and standards of electrical measurements. Instrument classifications and characteristics. Measurement analysis. Measurement of DC and AC current and voltage using analog and digital instruments. Power, power factor and energy measurements. Measurements of resistance, inductance, and capacitance. Frequency and period/time–interval measurements. Noises. Transducers. Calibration.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|----------------------------|---------------|--------------------|
| 01205219 | Applied Probability for EE | 3 | Tue / Thu 8.30–10 |

Course Description

Axioms of probability. Conditional probability. Independent events. Independent trials. Discrete random variables. Continuous random variables. Expectation. Functions of a random variable. Conditional distribution. Conditional expectation. Pairs of random variables and their joint distribution. Function of two random variables. Independent random variables. Moment generating functions. The Central Limit Theorem. Sample statistic. Confidence interval. Hypothesis testing. Parameter estimation. Applications in electrical engineering.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|--|---------------|--------------------|
| 01205325 | Communication Network and Transmission Lines | 3 | Tu / Thu 10.30–12 |

Course Description

Wire and wireless communication. Wire communication network. Y, Z, F, G, H matrix. Relation. Connection and basic circuits. Network transformation. Transmission quantities. Signal transmission circuit techniques. Wave filters. Attenuator. Impedance matching. Transmission line theory. Equation. Solution for low, medium, high frequencies. Primary and secondary constant. Incident and reflected waves. Standing wave ratio. Line characteristics for open, short, terminated load. Lossless and lossy lines. Reflections in time domain. Bounce diagrams. Near-end and far-end crosstalk. Differential signaling. Composite line, types of cable, unshielded twisted pair, coaxial cable and current cable standards.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|-----------------------|---------------|--------------------|
| 01205327 | Mobile Communications | 3 | Tue / Thu 14.30–16 |

Course Description

Wireless communication system. Theory and principle of mobile communication system. Characteristic and impact of radio propagation. Modulation techniques. Speech coding. Diversity channel coding. Multiplexing technique. Interconnection components for mobile communication system. Standards of current mobile communication, 3G, 4G, 5G and beyond. Cellular systems. Multiple access and interference management. Capacity of wireless channels. Multiuser capacity. MIMO system.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|----------------------------------|---------------|--------------------|
| 01205348 | Electrical Engineering Materials | 3 | Tue / Thu 9-10.30 |

Course Description

Structure of materials. Electrical properties of materials. Magnetic properties of materials. Optical properties of materials. Electrical conductors. Introduction to semiconductor devices. Superconductivity. Solid, liquid and gas dielectrics. Applications of materials in electrical power devices.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|---------------------------------------|---------------|--------------------|
| 01205354 | Electrical System Design in Buildings | 3 | Tue / Thu 9–10.30 |

Course Description

Power distribution schemes. Standards for electrical installation. Codes of conduct for safety in electrical installation. Electrical equipment and apparatus. Load calculation and estimation. Electrical wires and cables. Grounding system for electrical installation. Raceway. Lighting and appliances circuit design. Motor circuit design. Short-circuit calculation. Load, feeder and main schedules. Power factor improvement and capacitor bank circuit design.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|--------------------|---------------|--------------------|
| 01205358 | Renewable Energy | 3 | Mon 9–12 |

Course Description

Introduction to energy systems and renewable energy resources. Potential of renewable resources in Thailand. Difference of conventional and renewable energy technologies. Renewable technologies such as solar, wind, biomass, geothermal, biogas, municipal solid waste, wave energy, fuel cell. Energy storages. Laws, regulations, and policies of renewable energy. Economics aspects.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|---------------------------------|---------------|--------------------|
| 01205371 | Process Sensors and Transducers | 3 | Mon / Wed 13–14.30 |

Course Description

Introduction to measurement and control devices. Analog and digital transducers. Distance, velocity and acceleration sensors. Pressure measurement techniques. Differential pressure transmitter. Fluid flow measurement includes primary meters, secondary meters and special method. Measurement of temperature includes nonelectric methods, electric method 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. pH Sensor. Conventional controller.

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| Course ID | Course Name | Credit | Date / Time |
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| 01205373 | Embedded Control Systems | 3 | Tue / Thu 10.30-12 |

Course Description

Introduction to embedded control systems. Programming language. Real-time operating systems. Interfaces between sensors, actuators, and embedded controllers. Applied control theory. Algorithms and implementations in embedded control systems.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|---------------------|---------------|--------------------|
| 01205451 | Energy Conservation | 3 | Mon / Wed 14.30–16 |

Course Description

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 system, heating ventilating and air-conditioning (HVAC) systems. Industrial motor. Cogeneration. Energy Conservations and management measures and economics analysis.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|---------------------------------|---------------|--------------------|
| 01205471 | Introduction to Robotic Systems | 3 | Tue / Thu 13–14.30 |

Course Description

Design, analysis, control, and operation of robotic mechanisms. Use of homogeneous coordinates for kinematics and dynamics. Camera orientation. Sensors and actuators. Control. Task planning. Vision and intelligence.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|---------------------------|---------------|--------------------|
| 01205479 | Internet of Things for EE | 3 | Wed 13-16 |

Course Description

Basic data communication. Computer network. Short-range wireless communication engineering. Personal area network and cloud computing. Internet of Things architecture and protocol. Smart sensor. Smart Actuator. Electronic circuit and radio frequency circuit for Internet of Things devices. Embedded systems for Internet of Things devices. Application of Internet of Things in electronic engineering, control system engineering, power system engineering and communication engineering.

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| Course ID | Course Name | Credit | Date / Time |
|------------------|--------------------------|---------------|--------------------|
| 01205481 | Digital Image Processing | 3 | Tue 14.30–17.30 |

Course Description

Human visual perception. Image sampling and quantization. Image sensing and acquisition. Introduction to image processing programming tools. Image enhancement in spatial domain. Detection of edge, line, corner, and basic shapes. Image segmentation and thresholding. Morphological image processing. Color image processing. Image transforms. Image enhancement in frequency domain. Image restoration. Current image processing applications.

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| Course ID | Course Name | Credit | Date / Time |
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| 01205494 | Selected Topics in Communication Engineering | 3 | Fri 9-12 |

Course Description

Study in selected topics in communication and intelligent network engineering.