❒ Undergraduate Program

In the undergraduate program, various fundamental courses in electrical engineering are offered including areas in circuit and semiconductors, control and systems, and telecommunications. Basic concepts in analog and digital domain are introduced from devices to systems.

The circuits and semiconductor area is focused on semiconductor technology which is one of revolutional industrial technology, which includes semiconductor component and VLSI design technologies. In the VLSI design field, computer-aided IC design and software development for design automation is introduced. In the semiconductor component field, basic semiconductor fabrication and physical analyses are introduced.

The control and systems area is focused on mathematical modeling for various dynamic systems including robots, airplanes, and satellites; and also control system analysis and design technology to make their behavior desirable.

The telecommunication area is focused on various theoretical aspects of wired and wireless communication technologies, including optical communication and computer networks.

❒ Graduate Program

In the graduate program, the department puts emphasis on cultivating engineers who can play the leading role in the electrical engineering field with thorough knowledge of the fundamental theories and practical capability to solve problems.

✐ Computer and System-on-Chip (SoC) Design Group

Computer architecture and modeling, systems programming, microprocessor and DSP chip design, neural networks, VLSI design methodology, algorithms for CAD tool, and mixed-signal circuits and systems.

✐ Communication and Networks Group

Communication theory, satellite broad-band communication, detection and estimation, and computer network.

✐ Information Systems Group

Image and speech processing, pattern recognition, imaging systems, adaptive signal processing, and data / speech communication.

✐ Wireless and Lightwave Group

Radiation and diffraction of electromagnetic waves, satellite communication systems, and optical communication.

✐ Nano Devices and Integrated Systems Group

Semiconductor device and processing, CMOS circuit design, device simulation, micromachining, MMIC, optoelectronics, solar cells, ferroelectrics, thin film transistors, and infrared detectors.

✐ Control and System Group

Control systems, intelligent robotic systems, factory automation, power conversion, and motor driving systems.

❒ Research Groups

✐ Computer and System-on-Chip (SoC) Design Group

There are basically two areas of focus in this group: computer systems and SoC. In the computer systems

area, the research objective is to study and design hardware and software architectures of computer systems including system modeling and simulation, system programming, and computer architecture design. In the SoC area, main research topics include the design of microprocessors, DSP cores, and digital, analog, mixed-signal circuits for various high-performance and low-power applications such as next-generation mobile wireless communication systems, digital TVs, displays, and ubiquitous sensor networks. Various electronic design automation (EDA) methodologies for design, optimization, and verification of SoCs are also pursued as promising research topics. Members of this group actively work together with other groups (systems or devices) and contribute to the top-level R&D and education by participating in such centers as CHiPS, MICROS, SIPAC, and IDEC.

✐ Communication and Networks Group

The Communications and Networks (CommNet) Group at KAIST is committed to providing educational underpinnings and research capabilities that are needed to advance the frontiers of wireless communication, networks, and their convergence. Research in wireless communication includes coding and modulation, multiple access communication, communication signal processing, MIMO systems, and communications circuits. Research in networks includes mobile networks, IP networks, broadband access networks, home networks, ad-hoc networks, multimedia networks, sensor networks and protocol design and implementation. In particular, the integration of communications and networks expertise in the CommNet is providing new methods for cross-layer design, analysis, and optimization of increasingly complex and demanding tomorrow's wireless communication networks.

✐ Information Systems Group

The Information Systems Group (ISG) brings together expertise in many areas including signal processing, communications, watermarking, computer vision, etc. The main research activities in the ISG are driven by the future needs and fundamental interests for more powerful, useful, and efficient methods and theories of information processing with particular emphasis on speech / image / communication information processing such as medical information processing, watermarking, computer vision, neural networks, statistical signal processing, pattern recognition, and digital mobile communications.

✐ Wireless and Lightwave Group

Our objective is to study the phenomena of electromagnetic waves ranging from radiowave to lightwave and apply them to the transport, networking, processing, storing and sensing of information. Major research topics of microwave group include the diffraction and scattering of electromagnetic waves by various objects, geometrical theory of diffraction, inverse scattering theory, and development of microwave circuits and subsystems. Lightwave group is focusing its efforts on lightwave systems and devices. The systems research includes long-haul transmission systems, all-optical networks, and fiber-optic access networks, and the devices research covers optical modulators, optical filters and switches, polarization converters, and optical sensors, etc.

✐ Nano Devices and Integrated Systems (NDIS) Group

Research in the NDIS group is focused on the invention of new devices and technology breakthrough with the objectives of providing well-trained engineers for demanding nano devices (NDs) and integrated system industries. Our research activities are diversified into SOI devices, nano-CMOS, poly-Si TFTs, a-Si:H solar cells, FPDs, nano-memory devices, SETs, FeRAM, nonvolatile (NV) polymer RAM, floating gate and programmable devices, NV analog memory, high-dielectric material and its electrodes, IR detectors, CMOS image sensors, bioelectronics, MEMS, single/poly-crystal TFT LCD, OLED, high-speed low-power VLSI algorithm, and RF circuit techniques. ND structures and process technologies are being developed using GaAs, InP, InSb and GaN for optoelectronic and microwave devices of LED, LD, PD, RTD, HBT, HEMT, and their integrated circuits of OEIC, MMIC as well as 3-D integrated packages and systems.

✐ Control and System Group

The aim of the Control and System Group is to study new theories of control systems, robotics, and power electronics, and also their applications for intelligent systems and industrial systems. Process control systems, automation of the production lines, real-time control, power plants, satellite systems, power systems, intelligent transportation system (ITS), and power conversion circuit and digital display circuit design such as PDP (Plasma Display Panel) and LCD TV are major areas for research by using hard- and soft-computing technologies. Also human-friendly welfare robot, humanoid robot, personal robot, and software robot (artificial creature), multi-robot cooperation, interface between robot and human user, and emotion-based robot are studied for application in industries and smart home in ubiquitous computing environment.