

## □ Undergraduate

The department has two different programs, CSE(Computer Science Engineering) and ECE(Electrical and Computer Engineering). The curriculum allows students in CSE or ECE to take common required major courses, which leads the students advance into various IT major fields in graduate level. In addition, its interdisciplinary curriculum allows students to acquire knowledge in both in technology and management (The students are required to take IT-Business courses.)

CSE/ECE offers Programming Fundamentals I (JAVA), Programming Fundamentals II (C, C++), Data Structure, Software Studio, Computer Architecture, Signal and System, Circuit Theory, Digital Logic Design+Lab, Programming Languages and Lab, Algorithm Design & Analysis, Operating Systems, Electromagnetics, Introduction to Telecommunication System, Electronic Circuit+Lab, Digital Filtering, ISUP A, ISUP B, UP, and Internship.

## □ Graduate

The department -- the graduate programs were established in March 1998 with 119 students -- produced 794 master's and 85 doctorates in 2008 and offers CSE (Computer Science Engineering), ECE(Electrical and Computer Engineering), DM(Digital Media),MSE/MSIT-SE (Software Engineering) programs. Internship research programs are also offered to the student.

Students are free to take courses offered in 14 different tracks including Internet, Optical Communication, Information Security, Wireless Communication, Bio System, which allows the students to acquire detailed knowledge in various IT fields.

### - Ubiquitous Computing and Embedded System Track

Ubiquitous Computing, the third wave in computing, is a next generation paradigm in which many invisible computers are integrated into background of our lives. Enabling such an environment requires great technological advances in intelligent computing devices, sensors that can detect environmental changes, interface technologies between human and computers, and communication technologies between devices. We offer basic courses such as wireless and wired communications, distributed systems, next generation Internet, real-time systems, human-computer interface, and device technologies.

### - Information Security Track

As information-oriented society is highly developed, information security technology is getting greater importance. Especially new applications of information security technology are emerging rapidly and this requires prompt development of related technology. The major research areas of Information Security Track are as follows: cryptographic algorithms including secret key cryptosystem, public key cryptosystem, digital signature, random number generation, hash functions, provably secure cryptosystems and cryptanalysis; network security issues including ubiquitous security, mobile/satellite security, firewall, virus and worm; system security including e-cash, e-commerce security, electronic vote, database security, and operating system security, etc.

### - Innovative Interaction Track

Innovative Interaction Track endeavors to induce much more intuitive, natural and effective interaction among human, computer and information by expanding the current interaction paradigm between human and computer, in order to utilize undiscovered dimensions of media and communicative means. The track offers opportunities for in-depth researches including Computer Graphics, HCI, Robotics, Bioinformatics, Machine Learning, Computer Vision and Information Visualization to achieve this goal.

### - Software Engineering Track

The role of software is increasingly important as tools for improving industry productivity and service quality

and helping us concentrate on more creative activities. Thus the ability to produce software more effectively, i.e. software engineering ability, is a major factor for competitiveness of a country. Software engineering track at offers, as graduate-level programs, PhD in Software Engineering, Master of Software Engineering, Master of Science in Information Technology-Software Engineering and Master of Science in Software Engineering. By jointly running MSE and MSIT-SE with CMU, offers world-class software engineering curriculum.

- Digital Intelligence Track

As humans accumulate various types of data, such as web data, science & technology data, and sensor data, through IT infrastructures, it becomes more and more important to process them in such a way that computer agents, as well as humans, can exchange and utilize them for a variety of tasks. The Digital Intelligence Track carries out research on extraction and management of knowledge from various types of data including multimedia; systems that require high level of intelligence such as perception and cognition; and intelligent interactions between humans and computers. In short, we explore the area where contents, intelligent computational models, and humans merge. More or less traditional disciplines covered by this track include: natural language processing, data/text mining, artificial intelligence, Web engineering, multimedia analysis, and HCI. We seek advances in fusion technology as well in the respective areas. Research results play a key role in the development of applications for USN, Telematics, Intelligent Robots, Bioinformatics, DMB, and Home Network areas.

- Computer System and Theory Track

For the past 30 years, remarkable progress has been made in computer science and technology. The progress of computer science and technology played a decisive role in reforming our society into IT-based society. This trend will continue for the time being, and computer science and technology will remain as a core technology in supporting IT-based society. Computer system and theory track teaches and conducts researches in fundamental areas of computer science and techniques. Next generation PC, Linux operating system, power saving compiling techniques, future programming languages, network theory, algorithm, and computational theory are the major areas of this track. In this track, numerous research projects had been conducted in various areas, and this will continue. Open source based application development, Web services, and E-health are the areas of current projects. We envision students in this track being able to readily create invaluable, necessary techniques and theories in this era of drastic changes, and becoming pioneering engineers in the long run.

- Biosystems Track

The primary goals of Biosystems track are to advance biotechnology through converging advanced electronics and information technology to various research subjects in biology and medicine and produce advanced experts who will lead the creation of novel knowledge through multidisciplinary research. In this track, we research bio-sensors, imaging, and electronics technology that detect and analyze biosignals responsive to the interaction of DNA, biomolecules, or model organisms and physical or biochemical matters. Furthermore, we pursue the understanding of biological functions and mechanisms through informatics analysis of massive amount of archived biological data and establish theories that can predict unknown biological phenomena. Eventually, we focus on the research fields that bring the advance of health care technology based on the biological knowledge.

- Fundamental Science and Converging Technology Track

Innovative convergence in every part of science and technology has become the key strategy to take the global leadership in 21st century. The "Fundamental Science and Converging Technology Track" aims at creating breakthrough technologies to lead the next generation through education and research on frontier sciences and

emerging fusion technologies. For this goal, we bring together faculties from various disciplines such as mathematical, physical, biological, computational, cognitive and social sciences, and build a unique collaborative environment where knowledge and technology can be exchanged and merged freely toward creating new breakthrough ideas. The educational goal of the track is to teach students how to think, research, and work in a creative way within and beyond fundamental sciences and converging technologies: students will take courses and have research opportunities in advanced core subjects in basic sciences and the state-of-art fusion technologies.

- Internet Track

Internet Track aims to study and research information and telecommunications network technology that is the key stone for the 21st century knowledge driven society buildup. Internet Track leads the optical Internet network research for the next generation telecommunication networks. Our research emphasizes network architecture, Internet traffic management, and optical IP routing protocol. Our track scope extends network architecture, internetworking, traffic control, signaling and routing technology for backbone, metro and access networks such as IP network, Optical network, and mobile network. Our group is performing a lot of projects funded by MIC, ETRI, KT, Samsung, LG, etc. and more focusing on global cooperation with foreign research institute, university or company.

- Optical Communication Track

Optical Communications is one of key technologies in broadband telecommunication networks and it is expected to make ultra-broadband multimedia era to come true. We aim at creating innovation in the field of optical communication Industry carrying out R&D topics such as optical Internet, terabit optical transmission technology, optical CDMA, optical interconnection and optical access technology through the joint R&D activities with Industries. We offer basic courses such as Modern Optics, Optical Communications and Optical Electronics. Optical Network, Optical Internet Protocol, Quantum Electronics and Nonlinear Fiber Optics are offered as main courses. Special topics such as Optical Communication System, Optical Switching, Optical Interconnection and Optical Internet are also offered.

- Multimedia Communications and Processing Track

Research areas of our track are mainly focused on high-quality, intelligent, and realistic multimedia information processing and communication including speech, audio, image, video and multimedia processing and related multimedia technologies. Furthermore, our track covers natural/synthetic audio-visual information (AVI) analysis, coding, enhancement, recognition, and synthesis and their related multimedia systems including next generation TV, Internet multimedia system and multimedia communication system. For advanced multimedia services, other areas such as 3-D AVI processing, multimedia contents indexing, and realistic communication are also our research topics. Projects currently being executed are SmarTV, Digital Broadcasting, MPEG-2/4/7/21, Contents-based Indexing, Ubiquitous Watermarking, Voice Color Change, Speech/Speaker Recognition, Multimodal Interface, etc.

- Wireless Communication Track

Mobile communication systems developed mostly for "anytime, anyplace" voice service have been facing a new challenge with additional theme for "any contents" data traffic service. With the scarce radio resource, frequency, there should be innovative ideas on efficient use of radio channels and resources. Research areas include, but not limited to:

- Modulation and coding for next generation wireless communication including multi-band OFDM, MIMO signal processing, and SDR,
- Wireless Ad Hoc network, wireless sensor network, and WPAN/WLAN,

- Radio systems engineering: radio resource management for efficient use of resources, optimal operation of wireless communication systems, cell planning, and network optimization.

- Radio and Bio Electronics Track

The Radio and BioElectronics(RBE) Track pursues several research objectives, covering a wide range of wireless transceiver, RF/Microwave circuits, microwave and millimeter wave applications including MMIC, antenna, mw/mm-wave system, and bioelectronics. In addition, based on the accumulated knowledge and skills achieved through the research work on electronics-to-electronics wireless technologies and microelectronics, the RBE Track pursues also research on new-conceptual human-to-electronics wireless connection technologies. The professors, currently participating in this track, are experts with hands-on experiences and in-depth knowledges in their respective professional area of RF/Analogue IC, high-speed optical communication IC, microwave MMIC, nano microelectronics, smart antenna, phase array antenna, tunable intelligent filters, and 3-D integration of RF/Microwave microsystems. Through a close mutual collaboration, the members of RBE Track are more efficiently and comprehensively pursuing their researches in the area of RF IC, microwave, millimeter-wave, and bioelectronics.

- System on Chip Track

SoC track focuses on the education of not only advanced wireless multimedia communication systems and algorithms, but also their SoC implementation methodology. Core wireless multimedia systems include wireless communication systems such as 3G/4G CDMA, WLAN, Bluetooth, MIMO OFDM, and multimedia system such as MPEG-4 &7, AMR audio codec. We offer SoC track courses such as Introduction to SoC, Digital Radio, Wireless Communication SoC Lab, Digital Radio SoC Lab, Wireless Communication Layer 2 and 3, VLSI Design, RF Transceiver, SoC Architecture, SoC Design Methodology, Embedded SW Programming, Analog IC, System Programming, DSP, Video Signal Processing, Communication System Design, Video System Design, IP Development and System Integration, Analog/Mixed Signal Design, High Performance Memory Architecture and Design, RF IC Design, Full Custom Design.