CONTENTS

COLLEGE OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

SCHOOL OF ELECTRICAL ENGINEERING ····· 1
- Electrical Engineering Major ····· 2
- Conmon Selective Courses ····· 3
- Basic Courses ····· 4
- Major Courses ····· 7
- Faculty Members ····· 15

SCHOOL OF COMPUTER SCIENCE ····· 17
- Computer Science Major ····· 18
- Basic Courses ····· 19
- Major Courses ····· 22
- Faculty Members ····· 29

COLLEGE OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

○ The Educational Goal of the College of EECS

The goal of college of EECS is to educate students so that they are not only good at fundamentals of their majors but also are well equipped with knowledge required to work in the global information society.

○ The Educational Objectives of the College of EECS

To nurture IT engineers with leadership, college of EECS has following educational objectives for its graduates.

- Students achieve expertise and application skills in the IT area.
- Students understand other academic fields and integrate them with IT technologies.
- Students have leadership to lead the IT society.
- Students have global sense and broad knowledge on IT technologies and development.

○ The Educational system of the College of EECS

The College of EECS is composed of two schools; the School of Electrical Engineering and the School of Computer Science. The former has an Electrical Engineering Major and the latter has a Computer Science Major.

SCHOOL OF ELECTRICAL ENGINEERING

○ The Educational Goal of the School of Electrical Engineering

The goal of the School of Electrical Engineering is to cultivate leading electrical engineers who can produce efficient engineering values in the society. The characters that the school intends to nurture is as follows.

- Engineers who can cope with fast-changing industrial environments
- Engineers who have both social leadership and engineering management ability

- Advanced researchers who lead creative researches and perform state-of-the-art development

○ The Educational Objectives of the School of Electrical Engineering

To make students possess right understanding and leadership in the fast-changing IT society, the School of Electrical Engineering has the following educational objectives.

- Students can solve engineering problems by using engineering understanding, analysis and application ability.
- Students can design systems by using expertise in electrical engineering and knowledge in new technology.
- Students have global competitiveness that they can work in any place in the world.
- Students have engineering leadership in specified industrial field.

○ The Educational system of the School of Electrical Engineering

The School of Electrical Engineering offers an one major, that is, the Electrical Engineering. And it operates the electrical engineering speciality program separately from the electrical engineering general program in conforming to the ABEEK's accreditation requirements. (For program-wise completion requirement and minimum credits for graduation, refer to the university regulations and rules related to the operation of the speciality program for the accreditation of the engineering education.)

Electrical Engineering Major

EE Major provides a well-organized education program to foster creative and trained electrical, electronic, and computer engineers who can solve high-tech engineering problems as well as practical ones. To achieve the approval of the electrical engineering program of ABEEK, students must take engineering preparatory courses and MSC (Mathematics/Sciences/Computer) courses. Engineering preparatory courses consist of responsibility understanding, communication, lifelong education, economics,

and English. MSC courses include Fundamental Physics I/II, Fundamental Chemistry I/II, Fundamental Physics Laboratory I/II, Fundamental Chemistry I, Fundamental Engineering Mathematics, Engineering Mathematics, Electronic Mathematics, Applied Mathematics, Probability and Statistics, Computer Sciences Laboratory and Programming Language.

Major courses provided by the School of EE are composed of basic major courses and advanced major courses. The basic major courses include Logic Circuit, Digital Engineering, Circuit Theory I/II, Creative Engineering Design, Application of microprocessor, and Application Laboratory of microprocessor. Advanced major courses provide more specific and advanced knowledge in six divisions. In addition, Seminar in Special Topics and many Design Project courses provide comprehensive knowledge and the chance to solve practical problems so that students foster their creativity and skill to put a theory to practice.

Common Selective Courses

- **Seminar in Special Topics (1)**

  Through communication between instructors and students, motivation and curiosity for science will be elevated. In addition, relationships among junior and senior students will be activated. This course will be an opportunity for students to prepare their professional goals. Depending on the instructor in charge, the title of this class can be calssifed into following three areas.

  - **Engineers' Basic Culture**

    Teachers initiate students into the engineers' basic culture with various activities such as reading clubs, field trips to the factories or the exhibition grounds, forums on specific topics, etc.

  - **Electrical Engineering**

    Industrial trend and concurrent topics based on electrical engineering majors are discussed. Special topics for job interviews will be also included in the class schedule. Efficient presentation skills and techniques for successful job hunting will be handled. Depending on lecturers, various and concurrent topics and class subjects on electrical engineering will be carefully selected and provided each semester.

- **Design and Engineering Practice**

  This course provides opportunity to understand the concepts of electrical system design, and students will learn how to solve practical problems of industry.

Basic Courses

- **Logic Circuit (3)**

  This course covers the theory and techniques for digital system design and analysis. The topics of this course include the binary number system, Boolean algebra, combinational circuit design and analysis. This course also introduces the fundamentals of sequential circuits design and analysis.

- **Electromagnetics I (3)**

  Electromagnetics is necessary to have a deep understanding of various electronic systems including microwave circuits, antenna, optics, semiconductors, and so forth. Principles of waves and propagation are the background topics. Lectures on the transmission line theory and electrostatic theory that include E-field, capacitance, and inductance are delivered.

- **Electronic Mathematics (3)**

  This course covers the fundamentals of mathematics for electrical engineering such as Taylor polynomial and differential equation. In addition, both Laplace transform and Fourier transform are covered as the tools of a frequency domain analysis, and the z-transform is dealt in terms of a digital signal processing.

- **Programming Language (3)**

  This course introduces the more complex elements of the C programming language including: functions, arrays, pointers, structures, and files. Examples, homework and applications of programming concepts make extensive use of the C programming language.

- **Fundamental Electronics Engineering Laboratory I (1)**

  Resistance circuits, R-C circuits, R-L circuits, oscilloscope manipulation, resonance circuits, AC bridge networks, and fundamentals of networks.

- **Digital Circuits Laboratory (1)**

  Component-level issues related to the testing and fault tolerance of digital systems. Topics include the test generation for combinational and sequential circuits, error detecting/correcting codes, self-checking and fail-safe logic circuits, the design for testability, built-in self-test circuits, and the testing of programmable logic arrays.

- **Digital Electronics (3)**

  This course deals with sequential circuit design and analysis, flip-flops, registers and counters, and various memory and programmable logic devices. Asynchronous circuits and fundamental interfaces are also covered.

- **Circuit Theory I (3)**

  In this course, some of basic quantities of current, voltage, power, and so on and their engineering expressions are introduced. And, components of linear circuits such as resistor, current source, voltage source, inductor, and capacitor are characterized electrically and their mathematical models are studied. Simple electric circuits with resistors are thoroughly analysed by using voltage division, current division, the superposition principle, nodal analysis, mesh analysis, and Thevenin and Norton equivalence theorems. Energy-storage elements are introduced and techniques are given to analyse the circuits containing these elements. Circuit analysis technique using phasor are introduced in solving sinusoidal steady-state responses.

- **Applied Mathematics (3)**

  This course mainly deals with the areas of numerical analysis and probability theory which are needed for various applied engineering courses. The topics of numerical analysis are Taylor polynomial, the error bond, Euler's method, and several iterative methods. Also, the topics of probability theory are the probability, random variable, expectations, probability distribution function, and so on.

- **Fundamental Electronics Engineering Laboratory II (1)**

  Ohms law, Kirchhoff's laws, and circuit analysis techniques such as node voltage,

the mesh current method, and circuit theorems, Independent and dependent sources, R, C, L and operational amplifiers. First and second order circuits. Steady state analysis and phasors.

- **Creative Engineering Design (3)**

  This course is to develop the ability of the unified thinking on the knowledge of electronics and other fields, the motivation on electronics through a team project experience, and to cultivate the basic communication skills and creativeness as an engineer. The overall electrical techniques and its implications of the theories are to be understood in the lecture, from which the team design projects are carried out in the design practice. The design-project portfolio should be maintained under the supervisor's instruction, and the final report of the creative design project should be submitted.

- **Microprocessor Application Experiments (2)**

  This course provides students with practical hands-on experiences with microprocessor software application and interfacing techniques. Topics include the configuration of microprocessor and peripheral components, I/O port control, interrupt handling, and the C programming techniques for embedded systems.

- **Circuit Theory II (3)**

  In this course, AC analysis techniques of linear circuits by using the transform domain are introduced. The course focuses on the theories of phasor and Fourier and Laplace transformations, and their applications to basic electric circuits are deeply studied. And, the concepts of frequency domain, complex frequency, frequency responses, transfer functions, impedance, admittance, maximum power transfer, analog filters, and two-port networks in linear circuits are discussed.

- **Microprocessor Application Engineering (2)**

  This course introduces basic computer organizations, microprocessor instruction sets, the design of various types of digital interfaces, and microprocessor system design considerations. Topics include detailed study of a particular microprocessor architecture and instruction sets (Intel 8051), I/O port programming, basic theory of interrupt handling, timer/counter, and serial interface.

Major Courses

- **Electromagnetics II (3)**

  Electronics and Communication technology is rooted in electricity and magnetisms that are integrated in the Electromagnetics theory. In this class, lectures on magnetostatics and Faraday's law are delivered. Propagation of EM waves are also dealt. Further, numerous applications including optical fiber, as well as antenna and satellite communications are included in the topics.

- **Electronic Circuits Laboratory I (1)**

  Power suppliers, diode characteristics, applications of various electronic circuits, transistor characteristics, basic amplifiers, fundamentals of two-port networks, and basic digital electronic circuits.

- **Electronic Circuits I (3)**

  Active circuit elements, diode, transistor, FET Amplifier circuit, biasing in the amplifier, fundamental circuits of the amplifier, and feed-back amplifier fundamentals.

- **Computer Organization and Architecture (3)**

  An introduction to the organization and operation mechanism of a digital computer system with a central processing unit(CPU), memory, and input/ output(I/O). Hardware structures such as register transfer and ALU design, arithmetic algorithms, control unit design by hardwired or microprogramming are taught. For the software structure, instruction set architecture, addressing modes, and programming flow are covered. Also included are memory system design based on memory hierarchy, cache, and virtual memory systems I/O system with transmission modes, bus control, and DMA. As prerequisites, Digital Logic Design and Microprocessors are recommended.

- **Circuit and Systems (3)**

  This course briefly reviews the basic circuit theories, focuses on the analysis and design of circuit and system used in the display driver, switched mode power supply, and motor driver system. The main part of the course is the theory and engineering of the analog circuit and system both in the time-domain and in the

frequency domain.

- **Signal and System (3)**

  The purpose of this course is to express continuous-time signals and systems in the time and frequency domain, and to teach students to analyse the expressed equations utilizing the Fourier transform and Laplace transform.
  The contents of this course include the definition of convolutions, Fourier transformation, and Laplace transformation so that students can analyse continuous time signals and systems both in the time and frequency domain. System design is also included in this course to provide the general concepts on causality and stability in designing linear time-invariant systems.

- **Semiconductor Engineering I (3)**

  Basic properties of semiconductors, the conduction process, carrier transport phenomena, the PN junction, and processing theory.

- **Communication Engineering I (3)**

  This course briefly reviews the mathematical analysis of signals and systems, focuses on the transform domain and manipulation of the signals and systems. The main part of the course is the theory and engineering of the analog communication system which includes amplitude modulation and coherent/ noncoherent detection, angle modulation, the characteristics of noises in communication systems, and the signal-to-noise ratios.

- **Probabilities and Statistics (3)**

  The objectives of this course are to introduce the principles of random signals and to provide tools whereby one can deal with systems involving such signals. Probability, random variables, and random process will be covered in this course.

- **Electronic Circuits Laboratory II (1)**

  Transformers, power calculations, and filters. Microelectronics circuits with diodes, the bipolar junction transistor, and field-effect transistors. One stage amplifiers: DC and small signal analysis.

• **Electronics Circuits II (3)**

Amplifier circuits, tuned amplifier, frequency response, rectifier circuits and oscillator circuits. Basic communication circuits, the power amplifier, feedback amplifier, and modulation circuits.

• **Microprocessor Design (3)**

This course investigates the architecture of various microprocessors. The topics include the concepts of ALU data and address buses basic instructions and their operational procedure based on basic instruction cycles logic, arithmetic, conditional branches, input and output instructions concepts of DMA interrupt interfacing techniques with TTL electronics components and application program development by use of a MDS system.

• **Control Engineering (3)**

An introduction to the analysis and synthesis of continuous-time control systems. The principles of feedback control, the root locus method, frequency responses, and state equations are treated. Concepts of controllability and observability will be covered.

• **Semiconductor Engineering II (3)**

Physics and the characteristics of semiconductor devices, device applications, impurity properties in semiconductors, and processing technology.

• **Digital Signal Processing (3)**

This course provides an overview of the design techniques of FIR and IIR digital filters by analyzing the basic concepts of digital signal processing. In order to execute the computations required for the design and implementation of the digital filters, an experimental procedure is included during the course in such a way that a DSP of TMS series, Provided by TI Co., is introduced. The architecture, characteristics and handling techniques of the TMS series DSP is explained. FFT and its application is also included.

• **Communication Engineering II (3)**

The first half of the course is devoted to the theory and practices of the pulse

modulation and analog-to-digital conversion, which consists of sampling, quantization, and pulse coded modulation. The other half covers the conceptional description and analysis of digital data transmission systems including data compression, bit error probability in AWGN channels, mutual information, and channel capacity.

- **Microwave Engineering Ⅰ(3)**

  An introduction to microwave engineering. Transmission line theory, planar transmission lines, and waveguides, microwave network analysis, impedance matching and tuning, as well as microwave resonators.

- **Teaching Theory of Electronics Engineering (2)**

  This course is offered for students intending to be teachers in secondary school. Laboratory technique principles and curriculum planning will be studied.

- **Textbook Research and Teaching Methodology of Electronics Engineering (2)**

  Textbook research of technical high school, teaching methodology to teach students of a technical high school.

- **Design Practice for Electronics Engineering (3)**

  This is the design project course for senior level student. The main purpose of this course is to build the capability of defining and solving an engineering problem by providing the experience of integrating various kinds of previous knowledge. Also, the technical reporting and oral presentation skill are dealt with. The topics of project are determined by the students' interest and the specialty of professors.

- **Control Engineering Lab (1)**

  Fundamental experiments of controller design using microprocessors. Basic concepts of 16 bit/32 bit microprocessors are introduced with SW/HW development tool kits. Various applications are implemented for dc/ac motor control and autonomous vehicle control.

- **Embedded System (3)**

  This course introduces basic concepts for embedded systems. Topics include design technologies for microprocessor system design, controlling peripherals, multi-tasking, task synchronization and real time operating system. As case studies, some programming applications on ARM-based Linux platforms and 188 -based uC/OS-II platforms are examined.

- **Digital Control (3)**

  An introduction to the analysis and synthesis of discrete-time control systems. State feedback control will be designed and computer simulation techniques of the control system will be covered with implementation issues.

- **Electronic Circuit Design (3)**

  A study of advanced electronics circuits and their applications with particular attention to parameters and characteristics which limit performance. Typical topics would be operational and instrumentation amplifiers, filter circuit, oscillator circuit, and timer and analog signal waveform generator.

- **Optoelectronics (3)**

  Topics on various optical communication systems to increase the communication capacity are covered. Optical fiber, laser diode, photo diode, LED, optical amplifier, and other passive optical components are analyzed and their applications are explained. Lectures on communication systems using optics such as SONET, ATM, WDM, Optical SCM, and Access PON are provided.

- **Integrated Circuits I (3)**

  Basic properties of semiconductors, the conduction process, carrier transport phenomena, PN junction, and processing theory.

- **PCB & CAD (3)**

  Design methodologies for schematic design, PCB design, PCB and IC layout, circuit simulation, and VHDL simulation for digital and analog circuits are studied in this course. And, laboratories for studying design methodologies are performed in this course and all students are required to perform their design

projects during the course.

- **Communication Engineering Laboratory (1)**

  We perform the experiments about digital modulation/demodulation methods for both binary(ASK, FSK, PSK) and multi-level(M-ary ASK, M-ary FSK, M-ary PSK, QAM/APK). Also, we foster the application capability for wireless resource structure and management of mobile communication systems by implementing the experiments of multiple access methods(TDMA, CDMA).

- **Microwave Engineering II (3)**

  An introduction to microwave systems. Circuits and devices incorporated in the apparatus and systems at microwave frequencies. Power dividers and directional couplers, microwave filters, isolators, phase shifters, converters, detectors, amplifiers, oscillators, and antennas.

- **Digital Communications (3)**

  This course introduces the fundamentals of digital communication system analysis and design techniques. The contents covered are the design of coherent and noncoherent receivers under white Gaussian noise. In addition, covered are MPSK, MFSK, QPSK, MSK, DPSK, and other digital modulation methods. Error control coding is also introduced.

- **Data Communications (3)**

  This course provides an introduction to the theory and practice of the design of computer and communications networks, including the ISO seven-layer model. Current network types and evolving network technologies are introduced, including personal, local, metropolitan, and wide area networks. The topics for this course include the QoS(Quality of Service) requirement of multimedia wireless networks, current standardization trends, signaling, encoding, modulation, transmission media, multiplexing, switching, error correction, MAC(Medium Access Control), LLC(Logical Link Control), ATM, traffic management, Internet Protocol(IP), routing, TCP/IP, and application protocols.

- **Data Structures and Algorithms (3)**

  This course provides a comprehensive introduction of computer algorithms and data structures. The course introduces the time and space complexities of algorithms, fundamental algorithms, and basic ADTs(abstract data type) including arrays, lists, trees, and graphs.

- **Power Electronics Engineering (3)**

  Introduction to the principles and applications of switched mode power supply. Typical topics are linear power supplies, and basic switching circuit such as buck, buck-boost, and boost converter.

- **Digital System Design Project (3)**

  This course deals with the entire project in the area of electronic engineering. Project topics are included as : microprocessor design, analog circuit design, VHDL programming, DSP programming, communication system, and control system etc. The design concept, design procedure, simulation, experiments, and documentation on the selected project is covered. The presentation of the selected project is required.

- **Power Electronics Laboratory (1)**

  Power supply circuit implementation with particular attention on parasitic elements such as the stray inductance and capacitance will be performed. Typical topics are buck, buck-boost, and boost converter.

- **Sensor Engineering (3)**

  This course introduces various sensing technologies. Physical principles of sensing devices including optical, magnetic, ultrasonic, semiconductor sensors are reviewed. Application areas such as temperature, pressure, location, humidity, etc. are studied in this course. Students are required to design measurement circuits and computer interfacing hardware and software.

- **Integrated Circuits II (3)**

  Transistor-level design theory of combinational and sequential logics with both static and dynamic circuit concepts. Design of digital subsystems including adder

and multiplier.

- **Integrated Circuits and Fabrication Technology (3)**

  A study of nonlinear electronic circuits and IC circuit design including nonlinear waveshaping, the nonlinear bipolar transistor FET model, and circuits.

- **Microwave Engineering Lab (1)**

  This course introduces basic concepts for Radio Frequency Communication and Microwave Engineering through hands-on investigation of technologies like RFID (Radio Frequency IDentification) and USN (Ubiquitous Sensor Network). Students will be exposed to practical design issues, such as International Standardization, Air-Interface Technologies, Protocols, Antennas, Wireless systems, etc. As case studies, some system design and firmware applications for UHF RFID systems are examined.

- **Radio Frequency Circuits (3)**

  This course introduces basic concepts for CMOS Radio Frequency integrated circuits using wireless circuit and system analysis techniques derived from Microwave Engineering theories. Topics include design technologies for wireless transceiver systems such as CDMA, wireless LAN, Zigbee, etc. As case studies, various wireless transceiver system components, including LNA, Mixers, VCOs, PLL, PA, etc., are designed, and their linearity and performance characteristics are examined.

- **Mobile Communications (3)**

  This course covers the concepts of cellular systems, interference, path loss models, fading effect and distribution, link budget, digital modulation, diversity, FDMA, TDMA, CDMA, MIMO, OFDM, multicarrier CDMA, frequency reuse and channel assignment, adaptive modulation, packet radio and capacity, power control, handover control, call processing and control, CDMA performance engineering, radio access networks, radio network planning, radio resource management, and CDMA traffic engineering.

- **Modern Control (3)**

  Analysis and design of feedback system for digital system is studied. The basic structure and principles of control hardward and program is covered. And embedded control system based on real time operating system will be covered. An electronic control system for vehicle and car network system will be given as application targets.

- **Field Practice (1)**

  This course provides field experience for students in research institutions and industries.

Faculty Members

Kim, Do Hyun
Kyungpook National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Control Engineering
dhkim@kookmin.ac.kr

Lim, Jae Bong
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
RF Engineering
ljb@kookmin.ac.kr

Cho, Hong Goo
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Microwave Engineering
hgcho@kookmin.ac.kr

Sakong, Sug Chin
Korea Univ., B.S.
Korea Univ., M.S.
Korea Univ., Ph.D.
Power Electronics
scsk@kookmin.ac.kr

Kim, Ki Doo
Sogang Univ., B.S.
Pennsylvania State Univ., M.S.
Pennsylvania State Univ., Ph.D.
Signal Processing
kdk@kookmin.ac.kr

Oh, Ha Ryoung
Seoul National Univ., B.S.
KAIST., M.S.
KAIST., Ph.D.
Computer Engineering
hroh@kookmin.ac.kr

Ahn, Hyun Sik
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Intelligent Control
ahs@kookmin.ac.kr

Kim, Dong Myong
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Univ. of Minnesota, Ph.D.
Semiconductor Devices and Integrated Circuits
dmkim@kookmin.ac.kr

Kang, Dong Wook
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Visual Communication
dwkang@kookmin.ac.kr

Hong, Sung Soo
Seoul National Univ., B.S.
KAIST., M.S.
KAIST., Ph.D.
Power Electronics
hongss@kookmin.ac.kr

Park, Young Il
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Texas A&M Univ., Ph.D.
Optical Communication System
ypark@kookmin.ac.kr

Min, Kyeong Sik
Korea Univ., B.S.
KAIST., M.S.
KAIST., Ph.D.
Semiconductor and Integrated Circuits
mks@kookmin.ac.kr

Jung, Kyeong Hoon
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Image Signal Processing
khjung@kookmin.ac.kr

Roh, Chung Wook
KAIST., B.S.
KAIST., M.S.
KAIST., Ph.D.
Power Electronics
drno@kookmin.ac.kr

Seong, Yeong Rak
Hanyang Univ., B.S.
KAIST., M.S.
KAIST., Ph.D.
Computer Engineering
yeong@kookmin.ac.kr

Kim, Dae Jeong
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Integrated Circuit Design
kimdj@kookmin.ac.kr

Jang, Yeong Min
Kyungpook National Univ., B.S.
Kyungpook National Univ., M.S.
Univ. of Massachusetts, Ph.D.
Wireless Networks and Communications
yjang@kookmin.ac.kr

Park, Jun Seok
Kookmin Univ., B.S.
Kookmin Univ., M.S.
Kookmin Univ., Ph.D.
RF/Microwave Circuit Design
jspark@kookmin.ac.kr

Song, Ho Jun
Seoul National Univ., B.S.
KAIST., M.S.
KAIST., Ph.D.
System Integrated Circuits
hjsong@kookmin.ac.kr

Jeong, Gu Min
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Embedded system
gm1004@kookmin.ac.kr

Kim, Dae Hwan
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Semiconductor Devices and Integrated Circuits
drlife@kookmin.ac.kr

Jang, Byung Jun
Yonsei Univ., B.S.
Yonsei Univ., D.S.
Yonsei Univ., Ph.D.
RF Engineering
bjjang@kookmin.ac.kr

Han, Sang Kyoo
Pusan National Univ., B.S.
KAIST., M.S.
KAIST., Ph.D.
Power Electronics
djhan@kookmin.ac.kr

Moon, Chan Woo
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Control Engineering
mcwnt@kookmin.ac.kr

Choi, Sun Woong
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Computer Network
schoi@kookmin.ac.kr

SCHOOL OF COMPUTER SCIENCE

○ The Educational Goal of the School of Computer Science

Recently, due to the ubiquity of computer and the remarkable development of the communication systems, it is rapidly increasing the social need for various kinds of information and its applications. As the cutting-edge science indispensable for the application of computers in various areas as well as the information processing via computer in this information oriented society, school of computer science offers the core knowledge needed to understand and to utilize the computer hardware and software. In offering the aforementioned core knowledge, the school of computer science establishes an educational system conforming to the international requirements for guaranteeing of continuous development and sets its goal to be nurturing IT specialists who can creatively adapt in the field with this international level of core knowledge.

○ The Educational Objectives of the School of Computer Science

To build up the leadership in the computer science area that can recognize and precede the rapidly changing information and knowledge oriented society in the right perspective, the school of computer science sets the following objectives which the graduates must have and educates the student accordingly.

- Students nurture the systematic understanding on the layered architecture of the computer system.
- Students maximize the adaptability on the application technologies in various areas.
- Students nurture the project management skills successful in the field.
- Students strengthen the communication skills need for a global IT leader.

○ The Educational system of the school of computer science

The school of Computer Science offers the single Computer Science major, and operates the computer engineering specialty program separately from the computer engineering general program conforming to the ABEEK's accreditation requirements. (For program-wise completion requirement and minimum credits for graduation, refer to the university regulations and rules related to the operation of the specialty program for the accreditation of the engineering education.)

Computer Science Major

With the goal of the school, nurturing IT specialties with global competency, students in the Computer Science major systematically study the basic theories of computer science in the introductory courses of the school and more specialized areas that can apply the basic theories in the computer science major courses.

In the senior year, students can take the various consumer oriented courses such as Embedded system courses consisting of <Embedded system>, <Embedded Application Software>, and <SoC design>, Network and communication courses consisting of <Web Service Programming>, <Cluster Computing>, <Distributed System>, and <Wireless Network>, Intelligent System courses consisting of <Intelligent System>, <Digital Vision Processing>, <Information Search System>, and <Pattern

Recognition>, and Software development courses consisting of <XML>, <Information System Securities>, <Web Service Programming>.

Furthermore, the curricula culminate in the Project I, II courses in which students choose a specialized topic, conduct research and implement their graduation portpolio. This procedure helps students learn the big picture of the computer systems, deepen their knowledge on the selected topic, and practice project management skills.

In addition to the major courses, students must take the math, basic science, liberal arts courses to learn the necessary basic knowledge and culture.

Basic Courses

- **Introduction to Computer Science (3)**

  Introduction to the concept of the computer system and its applications including C computer programming language. Topics include computer hardware and software, computer networks and data communication, the Internet and multi-media, the organization and characteristics of modern digital computers, the role of operating systems and application software, wireless communications, and the understanding of multimedia and problem solving technology. In C language, topics includes functions, array, string, structure, pointer, and file input/output.

- **C++ Programming (3)**

  Introduction to the concept of object-oriented programing language, C++, which is the most popular object-oriented programming language. The characteristic of object-oriented programming language is encapsulation, polymorphism and inheritance. Topics include dynamic memory allocation, class, object, constructor, destructor, access control to member variables and member functions, function overloading, operator overloading, this pointer, multiple inheritance and containment, pure virtual functions, exception handling, scope, linkage, and storage duration.

- **Discrete Mathematics (3)**

  Introduction to the concept of mathematical techniques often used in computer science. Topics include compound proposition, logical operators, universal qualifier, existential qualifier, mathematical induction, direct proof, indirect proof, set theory, ordered pair, relation characteristics, composite function, injection,

surjection, bijection, matrix, inverse matrix, Gaussian elimination, Gauss Jordan elimination, integer functions, binomial coefficients, generating functions, discrete probability, r-permutation, an introduction to asymptotic analysis, graph, tree, algorithm, complexity, and logic algebra.

- **Probability and Statistics (3)**

  Introduction to the concept of statistical analysis and statistical induction. Students, who have the background of calculus, will study useful and interesting ideas of the mathematical theory of probability and to a number of applications of probability to a variety of fields including genetics, economics, geology, business, and engineering. Topics include the basic results and methods of both the discrete and continuous probability theory, conditional probability, independent events, random variables, jointly distributed random variables, expectations, variances, covariances and how to use SAS statistical software package.

- **Data Structure (3)**

  The class offers an introduction and concepts of various data structures fhal need to solve the real world problems and the principles and concepts to describe algorithms. Topics include data abstraction and abstract data types, lists, stacks, queues, the searching tree, dictionaries, priority queues, and other structures. Students will implement programs (via C, C++, Java) that make use of data structures and algorithms.

  The structure, computation, and characteristics for all types of information in computers is studied. The design and analysis about algorithms concerning with data structure are practiced.

- **Computer Architecture (3)**

  Introduction to the architecture and organization of computer systems. Topics include representation of data and instruction, implementation of arithmetic logic units at logic gate level, execution models of non-pipelined and pipelined processors, memory system hierarchy and input/output operations. Performance issues are also dealt in this course.

- **Linear Algebra (3)**

  Introduction to linear algebra. Topics include systems of linear equations, Gaussian elimination, matrices, determinants, Cramer's rule, vectors, vector spaces, basis and dimension, linear transformations, eigenvalues, eigenvectors, and quadratic forms.

- **Operating System (3)**

  Introduction to the concepts and design of operating systems. Topics include processes and threads, CPU scheduling, mutual exclusion, synchronization, deadlock prevention and avoiding, memory management, virtual memory, caching and TLB, I/O, disk management, naming and directory concept. Students will extend a kernel for multi programming from the primitive version.

- **Network and Data Communication (3)**

  An introduction to communications protocols used in computer networks. Topics include functionality, specification, verification, implementation, and the performance analysis of protocols. The protocols in all 5 layers of Internet are intensively discussed as an instance of the computer networks.

- **Numerical Analysis (3)**

  An introductory course in numerical methods. Topics include solution of one-variable equation, solution of system of linear equations, solution of nonlinear systems, curve fitting, data interpolation, numerical differentiation and integration, solution of differential equations. Source of numerical errors are also studied and usage of popular numerical package, MATLAB, is introduced in this course.

- **Algorithms (3)**

  An introduction to the design and analysis of algorithms. This course covers a number of ideas and techniques useful for designing and analyzing algorithms. Basic paradigms, e.g., divide and conquer strategies, greedy algorithms, dynamic programming, back-tracking, graph algorithms will be focused. A practical side of algorithm design is also explored with interesting examples of the designing techniques.

Major Courses

- **Digital Logic Design (3)**

  This course introduces basic theories and techniques of digital system design at logic gate level. Topics include logic expression minimization, combinational logic design, sequential logic design, and simple microprocessor design.

- **Web Programming (3)**

  This course covers Web-related programming. As the computing environments are rapidly changing, the programming knowledge on the Internet is indispensable these days. Especially, in web programming area, new technologies in both client and server side are continuously developed. In this course, to introduce the web programming concepts to sophomore of the school of computer science, client side web programming will be focused. Students will understand the characteristics of World Wide Web and learn the basic syntax of HTML documents.

  Students will also use Javascript to write more complex client programming.

  To do this, they will learn and understand the basic concepts of the communication to the servers, user interface, event handling, and window object control. Furthermore, by CGI programming, the students will understand the basic server side web programming.

  The course offers various programming laboratories to make the students experience the programming practice so that they can learn the basic theories and background needed to work in this field.

- **Creative Engineering Design (3)**

  This course aims to motivate sophomores to cultivate their interest in diverse fields of computer science, and to understand the concept and process of software design. Creativity, management of team project and communication skills are exercised in this course. This goal is achieved in conducting team project where each team designs user interface of its own imaginary computer system or application and where the team gives public presentation of its design.

- **System Programming (3)**

  Introduction to computer organization and system softwares. Topics include von-Neuman architecture, machine instructions, various addressing mode, assembly language and assembler, relocatable loader and linker, functional call mechanism, activation record, and runtime system for high level language. Students will build CPU emulator by designing their own instruction set, and implement a relocatable loader and an assembler for own assembly language.

- **Java Programming (3)**

  This course is an introduction to programming using Java. The course also covers the fundamentals of object-oriented programming utilizing the Java programming language for general purpose programs. Topics include the Java programming environment, fundamental programming structures in Java, objects and classes, inheritance, interfaces and inner classes, graphics programming, event handling, user interface components with Swing, applet programming, exception and debugging, and streams and files.

- **Visual Programming (3)**

  Introduction to the concepts and design of windows programming providing graphic user interface. Topics include how to use AppWizard in order to create MFC (Microsoft Foundation Class) main framework, MFC basic class hierarchy of main frame class, document class and view class, event-driven message and message handler, dynamic data exchange, dynamic data validate, modal dialog box and modal-less dialog box, file input/output and serialization, and formview. Students will practice the skills for windows programming on Microsoft Windows operating system.

- **Programming Languages (3)**

  An introduction to the theory and implementation of modern programming languages. Topics include implementation techniques for traditional block structure and type systems, abstraction and procedure mechanisms, and storage management. Basic concepts of functional programming, logic programming, and object oriented programming are introduced for the recognition of various types of the languages.

- **File Processing (3)**

  Introduction to basic concepts of file processing and its representative processing methods including sequential processing, sorting and merging of files, file indexing. Especially, the various indexing techniques such as B-tree, hasing, quad-tree, R-tree, inverted file and signature file are studied.

- **Computer Graphics (3)**

  Introduction to the concept of virtual reality based on a basic theory of two-dimensional and three-dimensional graphic processing. Topics include the explanation of a graphic hardware system and how to use it, software technology such as drawing, geometry, transformations, typogrphy, splines, interpolation, input technology, interaction technology, light, color, digital cameras, displays, exposure, imaging, filtering, sampling, compression, digital videos, HDTV, geometric modeling, rendering, CAD, animation, and art.

- **Object-Oriented Analysis and Design (3)**

  This course is an introduction to software analysis and design based on object-oriented concepts and the UML notation, and shows some realistic applications of object-oriented development. Topics include UML, the unified process, understanding requirements, use-case model, layered architectures, package design, designing objects with responsibilities, design patterns, and mapping designs to code.

- **Microcomputer System Design (3)**

  This course introduces fundamentals of computer system design for students who are familiar with digital logic basics and processor architecture. This course handles various topics of interconnection among CPU and IO devices. Topics include system bus design standards, IO interfaces, and PC system architecture.

- **Advanced System Programming (3)**

  Introduction to system programming for Linux or UNIX. Topics include process control, programming with system calls and standard library, signal processing, interprocess communications such as PIPE, FIFO and IPC facilities, socket programming, and multi-threaded programming based on pthread library. Students will practice the skills for system programming on Linux.

- **Network Programming (3)**

  This course covers various network programming issues. This includes a wide spectrum of socket library-based programs ranging from simple file exchange & chatting program, via HTTP client and server programs, all the way up to mobile & wireless network programs.

- **Artificial Intelligence (3)**

  Introduction to basic concepts in artificial intelligence from a computer science perspective. We learn how to find innovative solutions to difficult, independently motivated problems, such as game playing, speech recognition, and visual object recognition.

- **Compiler (3)**

  An introduction to compilation techniques for high level languages. Topics include lexical analysis, grammars, parsing, symbol-table management, type-checking, run-time storage organization, code generation, and optimization. The course involves a substantial project, to develop a compiler for a significant subset of a high-level programming language.

- **Database (3)**

  Introduction to relational database systems. Topics include file organizations and indexing, relational data model and relational database, database query language and SQL, embedded database programming, database interface to Web programming and ODBC.

- **Software Engineering (3)**

  Introduction to the concept of the software development process. Topics include software development cycle, software specification, software design, software implementation, software testing and validation, software quality improvement, software productivity, software verification, software industry, software quality, and several topics concerning software engineering.

- **Embedded System (3)**

  Concept of embedded systems is introduced and software development process

of embedded systems is taught in laboratory sessions using embedded system development kit. It includes building bootloader, kernel, file system, and device drivers of various I/O devices. The software development is based on linux OS and installation of software development toolchain is also part of the laboratory sessions.

- **SoC Design (3)**

  In this course, students learn how to design a digital system using VHDL (or Verilog HDL) at advanced level and perform hands-on practices on a FPGA reference platform. Topics include timing simulation, FPGA structure, SoC design process, and small system design practices such as digital watch, vending machine, and so on.

- **Web Service Programming (3)**

  This course has a practical emphasis on the design and techniques for developing web applications, mainly focusing on server-side web programming using servelts and JSP. Topics includes software installation for Java server developers, Web application deployment directories, servlets, processing HTTP form data, cookies and sessions, basic JSP scripting language, using JavaBeans with JSPs (tags and properties), custom tag libraries, in-depth guide to Web application configuration, and programmatic security (including using certificates and SSL).

- **Cluster Computing (3)**

  Introduction to concepts and terminology of parallel computing. Topics includes concepts of parallel computer memory architecture such as shared, distributed, and virtual shared memory, parallel programming model such as shared memory, message passing, data parallel, pipelined, and threads model, and deign issues for parallel programs. Student will build their own cluster machine and test their own parallel programs based on MPI.

- **XML (3)**

  XML is a markup language, used to describe the structure of data in meaningful ways. Anywhere that data is input/output, stored, transmitted from one place to another, is potential fit for XML's capabilities. The most well-known appli-

cations are web-related, but there are many other nonweb-based applications. The objective of this course is to teach students what XML is, how it works, and what technologies surround it. Topics include Namespace, DTD, XML Schema, DOM, XPath, and XSLT.

- **Intelligent System (3)**

  This course begins with the different soft computing architectures and a quick introduction of the key components of soft computing: artificial neural network, fuzzy logic, approximate reasoning and evolutionary algorithm. Some simple applications where hybrid systems have performed better than stand alone techniques are also discussed.

- **Digital Image Processing (3)**

  Introduction to the concept of the general principles of comprehensive image processing methodologies. Topics include image acquisition and display, image enhancement properties of the human visual system, color representations, sampling and quantization, point operations, linear image filtering and correlation, transforms and subband decompositions, nonlinear filtering, contrast and color enhancement, dithering, image restoration, image registration, image compression, image division, image expression and simple feature extraction recognition tasks.

- **Project I (3)**

  In this course, students spend a whole semester performing projects to integrate the theories and techniques learned from courses. The project teams are organized before the semester starts and all the projects are executed following software engineering process steps. Project I aims at implementation of core parts of the objective results while Project II aims at completion of the final results.

- **Intern Program (3)**

  This course aims at providing the students with the opportunities of industry experiences and professional communications. The intern program duration ranges from two months to a whole semester depending on the status of the participated students. The company participants are selected before the semester starts.

- **Embedded Application Software (3)**

  This course introduces basic techniques for application specific embedded system design and provides the students with hands-on practices experiences on embedded system evaluation platforms. Currently, topics include various implementation techniques for wireless communication terminals including cell phones, smartphones, and multimedia terminals.

- **Distributed System (3)**

  This course is an introduction to the concepts and principles of distributed systems. Topics include characteristics of distributed systems, system models, networking and internetworking, distributed interprocess communication, distributed objects and remote invocation, distributed middleware and applications such as the web and peer-to-peer systems, CORBA case study, operating system support, security, distributed file systems, name services, time and global states, coordination and agreement, mobile and ubiquitous computing, and web services.

- **Wireless Network (3)**

  The course offers introduction to the functionalities of wireless networking, wireless Internet. With the basic functionalities, the students will learn the application architecture, implementation and theories.

- **Information System Security (3)**

  Introduction to the concept of the information security management system. Topics include access control, definitions and key concepts, cryptography, encryption systems, symmetric and asymmetric algorithms, digital signatures, management of cryptographic systems, physical security, layered defense model, security architecture and design, security evaluation methods and criteria, business continuity planning and disaster recovery planning, business impact analysis, continuity and recovery strategy, telecommunications and network security, application security, databases and data warehouses, operations security, legal, regulations, compliance and investigation.

- **Information Retrieval System (3)**

  This course is an introduction to the basic techniques about the design and

implementation technologies of information retrieval system. Topics include the overview of web search engines, inverted file system, large-volume data storage and encoding method, documentation classification, document clustering, automatic summarization, text mining. In addition, Korean language processing techniques like Hangul code system, morphological analysis are introduced for the language dependent technologies of Korean information processing.

- **Pattern Recognition (3)**

  Introduction to the concept of the an introduction to the principles of pattern recognition. Topics include techniques for the processing and recognition of images, statistical pattern recognition, Bayesian decision theory, Neyman-Pearson criteria and Bayes risk, parameter estimation, maximum likelihood principle and Bayesian estimation, nonparametric methods, kernel density estimators, convergence rates, and error bounds, feature selection and generation, Fisher's linear discriminant, model selection, Occam's Razor and minimum description length principle and learning theory.

- **Project II (3)**

  In this course, students spend a whole semester performing team projects to integrate the theories and techniques learned from courses. The project teams are organized before the semester starts and all the projects are performed following software engineering process steps.

Faculty Members

Woo, Chongwoo
Seoul National Univ., B.S.
Minnesota State Univ., M.S.
Illinois Institute of Technology, Ph.D.
Artificial Intelligence
cwwoo@kookmin.ac.kr

Hahn, Kwang-Soo
Seoul National Univ., B.S.
Texas Tech Univ., M.S.
Texas Tech Univ., Ph.D.
Pattern Recognition
kshahn@kookmin.ac.kr

Han, Jae-Il
Yonsei Univ., B.S.
Syracuse Univ., M.S.
Syracuse Univ., Ph.D.
Computer Architecture
Jhan@kookmin.ac.kr

Choi, Joonsoo
Seoul National Univ., B.S.
KAIST., M.S.
New York Univ., Ph.D.
Algorithm
jschoi@kookmin.ac.kr

Kim, Hyeokman
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Database
hmkim@kookmin.ac.kr

Im, Eun-Jin
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Univ. of CA, Berkeley, Ph.D.
High Performance Computing
ejim@kookmin.ac.kr

Lee, Sanghwan
Seoul National Univ., B.S.
Seoul Natianal Univ., M.S.
Univ. of Minnesota Twin Cities, Ph.D.
Computer Network
sanghwan@kookmin.ac.kr

Kim, Youngman
Seoul National Univ., B.S.
KAIST., M.S.
Ohio State Univ., Ph.D.
Computer Network
ymkim@kookmin.ac.kr

Hwang, Suntae
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Univ. of Manchester., Ph.D.
Grid Computing, Parallel Computing, OS
sthwang@kookmin.ac.kr

Kang, Seung-Shik
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Natural Language Processing
sskang@kookmin.ac.kr

Lim, Sung-Soo
Seoul National Univ., B.S.
Seoul National Univ., M.S.
Seoul National Univ., Ph.D.
Embedded Real-Time Systems,
sslim@kookmin.ac.kr

Kim, Sang-Chul
Kyungbuk National Univ., B.S.
Changwon National Univ., M.S.
Oklahoma State Univ., Ph.D.
Digital Communication
sckim7@kookmin.ac.kr