

© Courses for Smart Device Engineering

Discrete Mathematics and Programming / 3hours, 3credits

Due to the nature of the computer operating in a binary system, the application process mainly targets discrete data. We learn sets related to computers and mathematical backgrounds such as functions, matrices, Boolean algebra, and algorithms, and implement them by programming.

C Programming and Lab / 4hours, 3credits

Students learn basic grammar and programming techniques of C programming. Basic program structures including arithmetic statements, conditional statements, repetitive statements, and functions are included. In problem-solving hours, we learn how to analyze various problems and design programs.

Advanced C Programming and Lab / 4hours, 3credits

In-depth learning and practice of C programming's grammar and programming techniques are addressed. In particular, we learn advanced programming techniques using self-reference structures and pointers, string processing, and file input/output.

Creative SW Convergence Nomad / 3hours, 3credits

This module class is consisted of three classes and students can choice courses what they want. Students learn how to merge ideas based on the software convergence.

Mechatronics programming / 3hours, 3credits

Students learn an essential engineering program (i.e., MATLAB) in using the field of Mechatronics. Students also learn the basic process of machine learning using MATLAB.

Machine Learning / 3hours, 3credits

Machine learning, a field of artificial intelligence, is covered in general. Students analyze the pros and cons of supervised learning and unsupervised learning methods, and learn how to choose an appropriate method for each example.

Digital System / 3hours, 3credits

Students study techniques for designing logic circuits (combinational circuits, sequential circuits) and Boolean algebra, which are the basics of digital hardware, and practice accordingly. Students do the design and practice of digital systems using basic elements of logic circuits (gates, multiplexers, counters, etc.).

Digital Signal Processing / 3hours, 3credits

Sampling theory, which is the basis of digital signal processing, characteristics of discrete signals, system theory in discrete hours, and Z-transform and DFT theories are studied.

Digital Communications / 3hours, 3credits

The purpose of this class is to examine the operating principles, performance evaluation, and comparative study of various digital communication systems. Performance analysis of digital modulation methods, such as baseband communication, amplitude shift keying (ASK), phase shift keying (PSK), frequency shift keying (FSK), and quadrature amplitude modulation (QAM), channel equalization method, and basic information theory are studied.

Digital Circuits Design / 3hours, 3credits

This class aims to learn basic techniques for the latest digital circuit design. Basic logic design, design using VHDL, and techniques for high-speed digital circuit design are studied.

Database / 3hours, 3credits

Students learn about the basic concept of database, database design method, database language, database stability and completeness, etc.

Linear Algebra with programming / 3hours, 3credits

Students Learn how to calculate vectors and matrices, and diagonalize matrices. Students learn LDU decomposition using Gaussian elimination, diagonalization using high-yield vectors, QR decomposition using orthogonal vectors, and also learn how to deal with linear equations with impossible and indefinite solutions.

Numerical Analysis / 3hours, 3credits

Students learn the basic concepts of approximation and error. The basic theories and algorithms of equations, interpolation, numerical differentiation and integration, and analyze their errors are included.

Deep Learning System / 3hours, 3credits

Understand deep learning systems, a field of machine learning that teaches people's mindsets to computers, and learn about various techniques such as deep neural networks, convolutional deep neural networks, and deep self networks.

Robotics / 3hours, 3credits

Students learn about analysis and design of robot manipulator in this class. This class includes robot kinematics (homogeneous transformation, inverse kinematics, and velocity kinematics), statics, kinetics (forward dynamics, and inverse dynamics), trajectory planning and generation, offline programming, actuators and sensors of industrial robot, and robot control.

Machine Vision System / 3hours, 3credits

This class consists of analysis of image characteristic (image formation, object recognition, image retrieval) to apply machine vision.

Mobile Communications / 3hours, 3credits

Students study basic principles of various high speed mobile communication through concept of cellular mobile communication, multiple access control technology, mobility support technology, and radio resource management.

Introduction to Semiconductors / 3hours, 3credits

Students achieve general information and basic know ledges of semiconductors to study about basis of quantum dynamics, atomic model, crystallography, understanding band gap theory, semiconductor doping, electrical characteristics of semiconductors in this class.

Semiconductor devices / 3hours, 3credits

The characteristics of the semiconductor devices such as MOSFETs and BJTs used in integrated circuits will be studied based on the basic theory of semiconductors, and their functions and

processes in integrated circuits will be explored.

Semiconductor Fabrication and Lab / 3hours, 3credits

Based on the understanding of the process for manufacturing semiconductors and display devices, the current status and trends of technology development are identified, and the understanding of the characteristics of the semiconductor and display industries is improved. Through the process of designing and manufacturing MOS diodes through simulation experiments, students learn the practical skills of semiconductor process design.

Internet of Things / 3hours, 3credits

This class introduces core technologies and the latest trends of the Internet of Things (IoT), such as IoT devices, OS platform technology, IoT service platform technology, big data management/analysis technology, wireless communication, and network technology for IoT connectivity.

Smart Display / 3hours, 3credits

This course covers theoretical and practical knowledge for TFT-LCD and OLED as smart display devices. It includes the basic structure, operational principles, manufacturing process, and related topics for smart display devices. Students learn flexible display or transparent display devices for smart devices and edge computing devices, as well.

Smart devices and experiments / 3hours, 3credits

This course covers theories, operational principles and manufacturing processes for smart sensors as semiconductor devices. Students learn basic and practical knowledge for applying smart sensors to intelligent systems. Especially, introduces state-of-the-art technologies and new trends of nano sensor technologies.

Smart sensors and systems / 3hours, 3credits

Students learn theoretical background for bio-electronic sensors including bio-signal sensing devices, smart sensors for diagnostic and monitoring, and various devices for smart health care systems. It introduces basic structure of smart sensors, operational principles, their applications, and related state-of-the-art technologies.

Smart Home Design / 3hours, 3credits

Various IoT services applied to the home environment are reviewed and discussed. Based on the discussion, students learn how to design a smart home.

Signals and Systems / 3hours, 3credits

Students learn about LTI system, Fourier Transform, and Laplace Transform to understand the characteristics of analog signals and systems.

Algorithms and lab / 4hours, 3credits

Students learn basic algorithms to process data and solve problems, and learn how to apply the basic algorithms to various problems. Students also learn algorithm design techniques through existing algorithms.

App Programming / 3hours, 3credits

In this course, students learn how to write codes for a smart device application and how to use multimedia for the application. The app development plan, system design, and UI/UX design will also

be studied.

Image Processing / 3hours, 3credits

Students learn basic image processing methods and image compression methods. Virtual reality and video communication will also be studied.

Wearable System Design / 3hours, 3credits

The objective of this course is to make a new idea that can be applied to smart devices such as smart phone, smart watch, and smart glasses.

Web Programming / 3hours, 3credits

This course is an introduction to programming for the World Wide Web. Students learn the relationship between clients and servers, how web pages are constructed using several technologies such as HTML, CSS, JavaScript, Dynamic HTML.

Artificial Intelligence / 3hours, 3credits

This course provides representations and algorithms used to build artificial intelligence systems in robotics and computer vision. The course mainly includes deep learning methods with application to computer vision system, natural language processing.

Internship / 6hours, 3credits

This course provides internship experiences to students during the summer and winter vacations. Students work with industries to improve practical skills and collaboration & communication skills.

Embedded System / 3hours, 3credits

The Embedded System course aims to provide that makes students understand the structure and the principle of the embedded system. This course teach the practice and the basic theory, the structure, and the system programming of the embedded system.

Automatic Control / 3hours, 3credits

The Automatic Control course supplies the foundation of the classic feedback control. In this course, students could understand state-equation, control input and corresponding responses. After taking this course, students can perceive the root locus, the stability of the system and the frequency domain response method. This course also provide the practice of the system and controller modeling by Matlab.

Data Structures and Lab / 5hours, 4credits

This course provides a primary method that stores data for programming. Furthermore, this course teaches the fundamental framework of a data structure and a calculation for concept realization.

Basic Electrical Circuit Theory / 3hours, 3credits

This course builds basic knowledge for the analysis and design of electric and electronic systems by dealing with the properties of basic passive elements constituting electric circuits, solving circuit equations, and analyzing signals in circuits. It is a basic subject for all electronic engineering.

Electrical Circuits and Lab / 3hours, 3credits

This course lectures the basic properties of electric circuits necessary for actual circuit construction and studies problems that occur during circuit construction through experiments. In the subject, we

examine the properties of RLC circuits, conduct experiments to construct basic passive element circuits, and learn how to use the measuring equipment and how to operate the latest electronic equipment.

Electronic Circuits / 3hours, 3credits

This course studies the basic knowledge to understand the characteristics of active elements and to learn how to analyze and design electronic circuits composed of these active elements.

Industry Seminar Series / 1hour, 1credit

In this course, experts in the field of ICT convergence are invited to give lectures on industries, technologies, and job expertise. In addition, students strengthen their job competencies such as communication skills and analytical thinking via a discussion-type class with experts.

Computer architecture and operating systems / 3hours, 3credits

Students learn the functionalities, implementation, and controls of computer hardware components such as processors, memories, and input/output devices. In addition, students also learn the basic theory of computer operating systems.

Computer Network / 3hours, 3credits

Students learn computer networks focusing on the Internet architecture and protocols. In particular, students learn topics including layered network topology architectures, packet communications, and network protocols related to network operations such as addressing, naming, forwarding, and routing.

Communication Systems / 3hours, 3credits

Students learn basic communication theories including signal analysis and spectrum analysis techniques. Students also learn theories related to actual communication methods (i.e., AM and FM) and their applications.

Probability and Statistics Programming / 3hours, 3credits

Students learn the basic theory of probability theory, which is the basis of engineering, and the basic theory of the probabilistic model of communication signals, which is the basis of communication. Students also learn probability theory, which is the basics of the Internet, and probabilistic models of signals, which are the basis of communication and signal processing, such as irregular variables and irregular processes.

AI Robot Design / 3hours, 3credits

This module class is designed to cultivate the ability to design and develop artificial intelligence-based robots or systems, based on the knowledge learned in artificial intelligence and robotics lectures.

JAVA programming / 3hours, 3credits

Understanding the grammar and object-oriented concepts of the JAVA program and acquiring basic JAVA program skills.

Capstone Design / 6hours, 6credits

Students form converged teams to design and develop prototypes to cultivate practical and collaborative skills.

