Course Description

Algorithm Design and Analysis
A systematic study of important and useful computer algorithms for solving practical problems; sorting and searching, string processing, geometric and graph algorithms, combinatorial optimization techniques; average and worst-case analysis, time and space complexity, correctness, optimality, and real implementation.
Database Management System Design
This course will discuss data modelling, SQL, database application development, indexing, query optimization, transaction management and database design. Concepts of parallel databases, data warehousing and data mining will be covered.
Software Development Methodology
This course deals from traditional methodology such as waterfall to up to date like scum. It also includes practical tools for industry domains.
Computer Network Performance Analysis
Development and application of mathematical models for queuing systems. Topics include Poisson and Erlang systems, bulk and priority queues, queuing networks, and the optimal design and control of queuing systems.
Evolutionary Systems
After introduction to the basic principles and techniques of a representative of the genetic algorithm for Evolutionary computation. Based on this genetic algorithm that can learn how to take advantage of this in the General search and optimization problems and machine learning, etc.   Also, learn how to solve the problem of local optima and compared to each other and review.
Topics in Wireless Mobile Networks
This course will study 3G / 4G, Wibro network structure in the latest systems, such as wireless mobile network, resource management, mobility management, QoS management, and the network convergence.
Topics in Operating Systems
Identify trends in operating areas and explore the latest subject of detailed field studies including Real-time operating system, high-performance storage systems, embedded operating systems, mobile computing, and distributed operating system
Distributed Systems

Based on a basic knowledge of the computer operating system and the network, study of the basic concepts for supporting applications that work in a distributed environment
Students learn the practical skills through practical design and implementation practice about Inter-process communication, naming, synchronization, security, concurrency.

Advanced Embedded Systems

The latest research on embedded technology and perform design tasks including system software and hardware design, development, verification,

Advanced Computer Architecture

In this course, after research operation of an electronic calculator, control, storage, and the various design examples of input and output devices, Studies Pipeline Processor, Multiple Processor, Special Purpose Computer etc.

Advanced Operating Systems

This course deals with Multiprocessor, computer systems connected through a network, real-time systems, and functions of the operating system should be applied in specialized systems such as embedded systems, and Implementation methods.

Advanced Database System

The survey problems of a relational database system that is currently the most widely used, and the various systems proposed to solve this problem. Also, deal with a knowledge-based system that is an advanced database service.

Advanced Software Engineering

Advanced concepts of object-oriented and architectural design, along with implementation. Pattern-based design of software using the Unified Modeling Language. Design patterns as re-usable architecture.

Advanced Object-Oriented System

The concepts behind the patterns approach will be studied, followed by a detailed examination of a selection of the various patterns. Gamma et al. have categorized these patterns under Creational, Structural, and Behavioral. In this introductory course to design patterns, the following patterns will be studied and applied: Creational Patterns: Abstract Factory, Builder, Factory Method, and Singleton; Structural Patterns: Adapter, Composite, Decorator, and Proxy; Behavioral Patterns: Iterator, State, Strategy, and Template Method. Projects consist of software problems whose design and maintenance call for the application of these patterns.

Topics in Internet Technology

This course introduces the latest Internet technologies related to the Internet field which is very fast changing. This course also discusses cloud-based client-server technologies which is one of the core technologies in the business field, and practices cloud and web-related main technologies to improve practical ability.

Topics in Software Engineering

This course helps students study the methodology and tools used in industrial field related to software engineering subjects to develop practical skills.

AI Mathematics

This course helps students study the methodology and tools used in industrial field related to software engineering subjects to develop practical skills.

Topics in Artificial Intelligence

Efficient and intelligent search techniques. Knowledge representation, e.g., logic, semantic net. Reasoning techniques including reasoning under uncertainty. Exposure to different artificial intelligence systems like planning, learning (including neural network). Programming experience in Prolog, Lisp, expert system shell.

Computer Vision

Introduces the theory of Low-level image analysis methods, stereo vision, motion, video image processing, and object recognition, and perform the actual application tasks.

Topics in Pattern Recognition

This course deals with the techniques of the various probabilistic method based on neural networks and pattern recognition, including the HMM.

Topics in Image Processing

This course deals with the continuous image characteristics, the digital image characteristics, the two-dimensional linear processing, image Restoration, image analysis, image coding, etc.

Topics in BigData

Students study and practice basic theory for data analysis by learning R language as a basic tool for data analysis.

Topics in Natural Language Processing

In this course, up-to-date probability and machine learning techniques are introduced. Research trends on natural language processes are figured out using survey on recently published papers. Related projects help to train application ability.
Topics in Machine Learning
In order to train learning model using big data and to infer solution, data collection, data process and various training methods are introduced. Entire processes for predict future data using the methods are introduced and are experienced. Also, discussion-based class is managed with up-to-date research trends and their applications.
Optmizations
Numerous algorithms introduced in the fields of artificial intelligence and machine learning are introduced. Methods to set an objective function based on given data and to optimize the objective function are trained. We explore optimization methodologies that are widely used in modern AI/deep learning algorithms and learn about their impact on performance.
Topics on Deep Learning
In the class, we deal with the latest deep learning methodology, discuss the theoretical foundation and implementation principle of deep learning, and are introduced models introduced in the latest top-tier conferences
Explanable AI
Explainable AI is a set of processes and methodologies that enable users to understand and to trust the results produced by machine learning algorithms/deep learning. We analyze the expected impacts and potential biases in AI models, model accuracy in AI-based decision-making, learn about fairness, transparency, and techniques to derive results.
Recommendation System
The recommendation system is not only used for recommending various contents such as recent videos and news, but also enables efficient decision-making in the information flood by selectively providing useful information to the user. In this course, we learn various contents related to recommendation systems, such as collaborative filtering, content-based recommendation, user satisfaction, performance evaluation, scalability, and security issues in information retrieval.
Graph Mining
Numerous information such as online social networks, e-commerce purchase history, and the web are expressed in the form of graphs. This course covers techniques for analyzing graphs that exist in real life through the application of detection techniques and clustering techniques to analyze the structure of macrographs based on various topics related to the understanding, analysis, and utilization of graph data.
Topics on Reinforcement Learning

The subject of this course is deep learning for reinforcement learning, an important field of machine learning and artificial intelligence. Recently, deep reinforcement learning is an important machine learning technology that is being used in all fields that require intelligent decision-making. In this course, students learn the basics of reinforcement learning and the latest applications.

Generative Models and Unsupervised Learning

The goal of this course is to provide an in-depth discussion of generative models and unsupervised learning. Students learn probability theory, the necessary mathematical tools such as optimal transport and stochastic differential equations, as well as specific implementations of algorithms ranging from classical GANs to state-of-the-art models.

Artificial Intelligence Applications

It introduces the latest AI technology and deals with various techniques and commercial applications required for actual implementation. Specifically, actual use cases such as network compression, network optimization, knowledge distillation, and quantization will be dealt with. We focus on research contents and detailed technologies from the latest top-tier conferences.

Knowledge Graph

A knowledge graph refers to a collection of interconnected descriptions of entities such as objects, events, or concepts accumulated from various information and knowledge sources. It stores linking and semantic metadata within the context. In this course, the concept of knowledge graph, construction methodology, and various use cases are studied.

Graph Theory

Linear Graph, Euler Graph Theory, Incidence, Cut-Set and Circuit Matrix related properties. Single Flow Graph, Logic Circuit Automata and their application.

Topics in Computer Graphics

A course designed to concentrate on special and state-of-the-art topics in 2D, 3D mathematical methods including, Scale-Conversion, Painting, Shading, Rotation, Clipping Windowing Hidden Surface Algorithm

Virtual Reality

Theory and practice of virtual reality (VR). Provides in-depth overview of VR, including input devices, output devices, 3D navigation techniques, 3D selection and manipulation techniques, system control techniques, interaction fidelity, scenario fidelity, display fidelity, design guidelines, and evaluation methods.

Parallel Algorithms

Deals with the basic concept of distributed processing. From the same basic concepts of time and state management, Deals with Balancing algorithm, a middleware for distributed processing, the Distributed File System and the subject of the operating system that is responsible for memory management.

Topics in Spatial Database
Space data consisting of is the base data for ubiquitous and mobile environments and the geometrical data of the attribute and variable length. To treat effectively, Studies on modeling techniques and multi-dimensional spatial index technology.
Topics in Multimedia Engineering
Study of the structure of the multimedia signal including JPEG, MPEG, P * 64, Wav, MP3 etc. After looking at for compression coding and decoding techniques and methodology of the multimedia signal, research for applications that can take advantage of these data. Research based on the necessary technology for the telematics and LBS (Location-based Services)
Topics in HCI
After dealing with Graphic structure of the X-Window system which can easily implement the user interface, and programming techniques, deals with the basic concept to build a user interface, such as caused by a voice synthesis and recognition.
Cluster/Grid Computing
Grid computing: its importance, architecture and issues; services and applications by type abstraction and virtualization; capacity planning; exploring platform as a service; security; mobile application development and case studies; graduate project encompassing advanced synthesis and application of grid computing principles.
Information and Network Security
This course is intended to give an in-depth understanding of computer system security. Security encompasses hacker challenges, malicious break-ins and insider threats. Topics include Basic Encryption and Decryption - Rivest-Shamir-Adelman (RSA) Encryption, El Gamal and Digital Signature Algorithms, Hash Algorithms, Kerberos; Program Security - Virus, Trojan Horse, Malicious Code, Covert Channels; Design of Trusted OS; Network Security - Firewalls, Tripwires; Intrusion Detection - Audit Trail-Based Schemes, Concurrent Intrusion Detection
Topics in Next Generation Network
This course deals with the next generation network including Next Generation Internet, mobile communication, satellite communication, optical communication, etc.
Topics in Smart App Development Methodology
This course introduces the concept of standard library to improve students' ability for App planning/design/development. In addition, this course deals with practical application development methodology to improve practical skills.

Topics on Time Series Analysis
Time series data refers to data arranged in time intervals. We learn theories and algorithms that represent time-series data (time-varying model, autoregressive model, multivariate time-series model, deep neural network-based prediction, etc.). Also, we deal about application cases in finance/stock, smart factory manufacturing, and medical fields. do.
Edge Computing
Unlike cloud computing, edge computing refers to computing technology that processes in real time through distributed small servers to solve the recent proliferation of IoT devices and the explosion of data volume. Students learn about concepts, architectures, and practical applications required for rapid data analysis required for the collection and processing of vast amounts of data and real-time response.
Metaverse
We carry out a project to design and build a creative metaverse virtual space by converging the metaverse 3D virtual space modeling method, virtual human form modeling and control method, intelligent virtual human conversation function modeling, and blockchain utilization technique.
Metaverse programming
We learn programming skills for metaverse content development. Also, we learn how to use development tools for metaverse development, understand metaverse users, implement games, and understand the use areas related to metaverse.
Technical Writing in Computer Science
Covers the actual writing practice of technical Writing and learning-related information including science Writing in engineering, engineering Screening terms of use, how to use this chart, plagiarism prevention, such as Science Writing in English.
Topics in IT Consulting
In this course, students acquire the ability to plan competitive information strategy planning by studying the latest business information system technology and the methodology to build information strategy planning.
ICT Convergence Technology
This course introduces the elements of ICBM(IoT, Cloud, Bigdata, Mobile), related technologies, business models and market prospect. In addition, this course presents the vision of the future intelligence information society through case studies applying ICBM and discusses technical solutions for resolving real difficulties.
Technical Presentation

We learn about the overall method related to thesis presentation in the field of engineering and strengthen technical presentation skills through direct presentation. We learn how to create slides, use engineering and English expressions, and learn about Korean and English presentation feedback.

Technical Projects in Computer·AI Convergence Engineering 1

Research and develop topics in recent in Computer·AI Convergence Engineering. Students should present their concrete output in the public conferences.

Technical Projects in Computer·AI Convergence Engineering 2

Research and develop topics in recent in Computer·AI Convergence Engineering. Students should present their concrete output in the public conferences.

Master Paper Research Work

Development and writing of a research paper for submission to the department, which specifies its format.

Doctoral Paper Research Work(1)

Development and writing of a research paper for submission to the department, which specifies its format.

Doctoral Paper Research Work(2)

Development and writing of a research paper for submission to the department, which specifies its format.