❒ Undergraduate Program

In our undergraduate program, we aim to provide students with an overall understanding of the computer science field, a solid grasp of fundamental theory and key concepts, and the skills to apply theory to diverse areas. We expose students to engineering aspects of computer system design and implementation.

The undergraduate curriculum is structured into three tiers: introductory, basic core, and applied courses. Introductory courses are: Introduction to Computer Science, Problem Solving, Discrete Mathematics, Data Structures, Digital Systems and Lab, and System Programming. Basic core courses are: Algorithms, Computer Organization, Programming Languages, Formal Languages and Automata, Operating Systems and Lab, Introduction to Database and Symbolic Programming. Applied courses include Introduction to Logic for Computer Science, Introduction to VLSI design, Compiler Design, Computation Theory, Data Communication, Introduction to Computer Networks, Software Project, Introduction to Software Engineering, Introduction to Artificial Intelligence, and Introduction to Computer Graphics. Seminar courses are also offered to cover latest research topics. That our undergraduate students have won many awards in computing festivals and international programming competitions attests to the strength and depth of our curriculum.

❒ Graduate Program

The department admitted its first master's degree students in 1973, and six master's degrees were produced in August, 1975. The first PhD student was admitted in September 1975, and the first PhD was granted in 1979. As of August 2014, the department has produced 1,888 masters and 639 PhDs.

The graduate program targets producing masters and PhDs who are strong in both advanced theory and application, with an emphasis on experimental approaches. Basic courses are categorized into the following three areas: theory, systems, and software. All students are required to take one course from each area, and then take advanced courses in one area of research interest. To actively seek out and expose students to the latest breaking technologies, special topics seminars are offered in artificial intelligence, distributed and parallel processing, next generation computing, software portability, VLSI and computer architectures, multimedia, fuzzy logic, computer graphics, virtual reality, etc. Our curriculum is flexible enough for a student to consult one's advisor and design a program that suits one's research needs and eventually publish extensively in domestic and international journals and conference proceedings.

❒ Research Areas

The members of the department in 2013 alone have published 87 international journal papers and 152 international conference papers
and received total of more than $13.5 million USD in research grants.

Foundations

Theory is a fundamental foundation of computing and includes research areas such as algorithms, graph theory, computational geometry, discrete geometry, programming languages, compilers, and cryptology. In particular, computational geometry studies efficient algorithms for geometric problems that come from applications in graphics, networks, databases, CAD, robotics, GIS, and other areas of geometric computation. The research on programming languages and compilers studies software development from its design stage to its deployment and maintenance; it analyzes and optimizes software to help people to use software safely, easily, and efficiently.

Systems provides experimental foundations for computing, encompassing continuously evolving research areas such as computer architecture, operating systems, networks, embedded systems, and real-time

systems. Building upon the strengths in the traditional systems research, our department is achieving global leadership in new systems research such as mobile systems with user experience, cyber-physical systems, cloud computing, and social network analysis.

Design

Various design techniques and tools are fundamental for fostering creativity in computing, and computational creativity is pervasive in all aspects of human lives. Our department focuses on developing creativity in designs for software, systems, and services.

Software engineering is a discipline to study the lifecycle of software including development, operation, and maintenance systematically and quantitatively. In particular, software engineering focuses on advancing rapidly changing software development paradigms and architectures as well as service technologies such as web-based computing, mobile computing, cloud computing,
and big data research.

Visual Computing

Visual computing studies how to make and use computing in order to efficiently process, understand, and express visual and multimedia data such as images, videos, photographs, drawings, movies, and multi-dimensional data. It encompasses computer graphics, computer vision, information visualization, image processing, information hiding, and multimedia forensics. Recent research topics include large-scale computer graphics and geometric processing, medical image processing and applications, computational photography and robot motion planning.

Information Service

With the advancement of information technology and its pervasive uses, personal and social data have been vastly increasing, and thus there is a rapidly rising need for intelligent processing and analysis of big data. We study algorithms, systems, and services for efficiently processing, managing, and analyzing big data. Research areas include databases, parallel search engines, web data management, multimedia/spatio-temporal data management, sensor network data management, data mining, and knowledge service.

The goal of artificial intelligence is to enable computers and machines to perform tasks that require a certain degree of intelligence. We study the foundational problems in artificial intelligence, which include visual and speech understanding, natural language processing, and planning. The core of our current research is making computers learn to solve these problems such that computers can understand and assist humans with intelligent behavior.

Social Computing

Social computing addresses novel services and technologies that are related to managing, analyzing, and understanding various social data that arise in individual and societal activities. This emerging research topic develops ample opportunities to provide foundational knowledge and tools for computational social sciences. Our faculty play leading roles with high global visibility in natural language processing for biology (BioNLP), social network analysis, data mining, computational journalism, and information security. In addition, we are actively studying semantic web and information retrieval that are fundamental for next-generation social computing.

Interactive Computing

Interactive computing is a research area for new HCI technologies. Computers in diverse forms, such as smart phones, tablets, tabletops, and smart spaces are now creating entirely new user experiences (UX) and require research to provide a new paradigm of user interfaces (UI). Some of our ongoing research topics include gesture interfaces, touch interfaces, haptic interfaces, and natural language interfaces. We are also expanding our research to more pioneering topics including organic user interfaces and braincomputer interfaces.