1. Introduction to the Department of Civil and Environmental Engineering

The Department of Civil and Environmental Engineering at KAIST was established in August 1982. Currently the department offers undergraduate and graduate programs. The mission of Department of Civil and Environmental Engineering is to contribute to the advancement of the profession, in Korea, and the world by: providing outstanding educational opportunities; performing ground breaking interdisciplinary research; developing innovative technologies; participating in international collaborations and activities; and promoting service, leadership and entrepreneurship by the faculty and students to address the complex technical and social needs of the present and the future. Our ultimate goal is to be a world leader and to produce world leaders in research, entrepreneurship, innovation, service and education in the areas of Civil, Architectural, Urban and Environmental engineering.

2. Research Areas

Structural Engineering and Materials, Geotechnical Engineering and Geosystems, Environmental Engineering and Sustainability, Urban and Architectural Planning and Design, and IT for Construction Engineering are the main research areas of the Department of Civil and Environmental Engineering at KAIST.

❒ Structural Engineering and Materials

Structural engineering combines art and science to design and build modern infrastructures that safely resist natural and man-made forces. Buildings, bridges, stadiums, offshore structures and other civil facilities define the traditional core of structural engineering. At the periphery of the field, structural engineering shares common interests with mechanical, aerospace, and naval engineering for the design of large, complex systems such as power plants, pipelines, aerospace vehicles, ships, and submarines. We have seven laboratories devoted to various research activities including dynamics analysis, quantitative analysis of stresses in concrete, seismic analysis and vibration control of large structures such as bridges, buildings and nuclear power plants, and to studies on safety and reliability, structural health monitoring, and designing an effective structure system through the investigation of the nonlinear behavior of structures.

❒ Geotechnical Engineering and Geosystems

Geotechnical engineering is fundamental for construction of all type of civil structures such as large underground space and tunnel, subway and highway, railroad, port and airport structures, etc. Since geotechnical materials are ambiguous, which are not easy to determine their engineering properties, the successful geotechnical engineer must develop a 'feel' for soil and rock behavior before designing a safe and economic geotechnical structure. Three of our laboratories perform researches on the analysis, design, construction, and maintenance of earth structures related to a variety of geo-materials and subjected to various loading conditions. Our researchers are also involved in geotechnical earthquake engineering, site investigation, non-destructive testing using elastic wave propagation characteristics, and development of geophysical characterization techniques on rocks in an effort to understand the shear behavior of jointed rocks for use in large underground spaces.

❒ Environmental Engineering and Sustainability

Environmental engineering applies principles of science and engineering to find sustainable solutions to environmental problems. Environmental engineers design municipal water supply and industrial wastewater treatment systems, develop technologies for remediation of contaminated sites by spills or improper disposal of hazardous substances, and provide solutions to one of the most important issues of our modern times such as climate change, global warming, greenhouse effects, CO2 sequestration, acid rain, and stratospheric ozone depletion. Environmental engineers are also involved in research related to fossil fuel replacement by "green" resources as bioethanol and biogas. Environmental engineering education and practice is multidisciplinary by nature and requires, in addition to traditional science and engineering components, knowledge of a range of other disciplines including ecology, geochemistry, public health, economics, and computer science. Our five laboratories are actively pursuing fundamental and practical research on physicochemical and biological approaches for water, wastewater,

contaminated soil, and solid waste treatment, as well as on sustainable management of environmental resources.

❒ IT, Planning and Design

We focus on a variety of domains ranging from urban and architectural theories, design methodology, representation and visualization techniques, structural and ecological sustainability, human oriented design, geographic information systems, digital fabrication and rapid prototyping as well as construction management and finance.

Using design as the vehicle for shaping of our futuristic built environment, we pursue to invent better environment for higher quality living or remodel existing buildings or cities to be upgraded to meet newly emerging civilization standards.

Our department also considers transportation engineering as a study of providing accessibility rather than the flow of people and goods as traditionally defined. The program highlights the evolution of today's transportation system including advancements in vehicle, fuel, and information technologies and the growing need for environmental sustainability. Education and research will focus on the future of the transportation system in a rapidly changing environment while understanding the wisdoms and findings that have been accumulated thus far.

IT-based civil engineering research fields include civil robotics, intelligent construction automation and robot, ubiquitous robotic infrastructure, and U-City management that are aimed at constructing smart and sustainable environment.