

□ Areas of Research

In order to improve efficiency of research and education, the faculty and education facilities are categorized into six research fields. Master's and doctoral students are encouraged to conduct in-depth studies in their major fields that they have chosen.

1) Micro/Nano Systems Technology

Micro/Nano Systems technology, which features high integration and high precision, has risen as a key technology. The important role of mechanical engineering in the development of the Nano/Micro Systems Technology is to develop and to apply the related components and system technology in the sub-areas listed below.

- Property measurement and behavior analysis on micro/nano scale
- Operating mechanism and control of nano systems
- Micro fabrication for MEMS and 3D measurement
- 3D micro/nanofabrication using Nano-Stereolithography
- Development of flexible and wearable sensing and electronic devices
- Mechanical properties and reliability of nanomaterials and nanodevices

2) IT-based Intelligent Mechanical Systems

IT-based Intelligent Mechanical Systems which implants intelligence to machine systems, is an interdisciplinary area combining conventional mechanical technology and new information technology. The main goal of IT-based Intelligent Mechanical Systems is to develop fundamental technologies and to apply them to the industry field.

- Intelligent robot systems (Humanoid, human-robot interaction and haptic interface)
- Controls, smart structures and entertainment engineering
- Intelligent machines and manufacturing systems
- Virtual reality engineering and e-production
- Environmental-friendly, intelligent and high precision machine
- Medical simulation

3) New Energy System

Thermofluid and Energy System deals with energy and environment problems such as new power/energy generation and conversion, and thermofluid flow. The study of Thermofluid and Energy System covers physical phenomena related to heat and fluid in the microstructures such as nano particle control, micro fluid flow, and micro coolers used in next generation key technologies such as BT, NT and IT.

- Measurement and numerical analysis of the heat transfer and fluid dynamics
- Flow controls, heat transfer enhancement
- Design of energy systems ranging from sub-micro to macro scale
- Engines, fuel cells, turbo systems and cooling of electronic devices, hydrogen energy
- Production and application of cryogenics and superconductivity
- Production and control of micro and nano particles

4) Biomedical Engineering

The goal of Biomedical System Engineering which has an academic basis in life science and biomedical engineering, is to discover the mechanism of living bodies in motion, and to utilize the mechanism in the diagnose of diseases, to invent new diagnosis methods, and to develop artificial organs, new

treatments and nursing techniques using medical-purposed robots. All of the activities are for the benefit of human beings.

- Biomechanics and biomaterials
- Cell mechanics and biomimetics
- Medical virtual environment and bioinstrument
- Postural control and sensory integration
- Surgery robots and tools

5) Mechanics & Design Innovation

The objective of Mechanics & Design Innovation is to develop creative and innovative technologies of the design and analysis for future-oriented machine, mechanism, software and machine system. The study covers the development of new design theory and technology, mechanics, the innovation of analysis method, and the development of advanced-materials and design database.

- Innovation and creation of mechanical systems
- Simulation of biological motions
- Development of new designs and technologies for modeling and governing equation
- Development and application of new materials to mechanical systems
- Innovation of the analysis and design programs and tools
- Simulation of tribo-systems

6) Pro Human Engineering

The goal of Pro Human Engineering is to implement a human-centered engineering approach and to design the machines that benefit humanity.

The activities include the study of human emotional response toward sound, vibration, vision, and touch and human reactions to machines, and the realistic implementation of human senses.

- Biomechanics research on generic characters of sound, vibration sound and touch
- Modeling and analysis of sound quality and vibration
- Methodology of evaluating and designing products after considering peculiarity of human senses
- Methodology of designing machines interacting between humans and machines
- Research on machines and systems contributing to human welfares