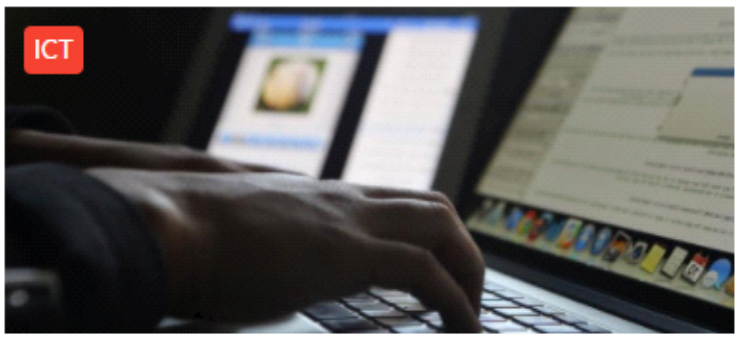
# ICT




**Host School/Campus**

ETRI School

**tag**

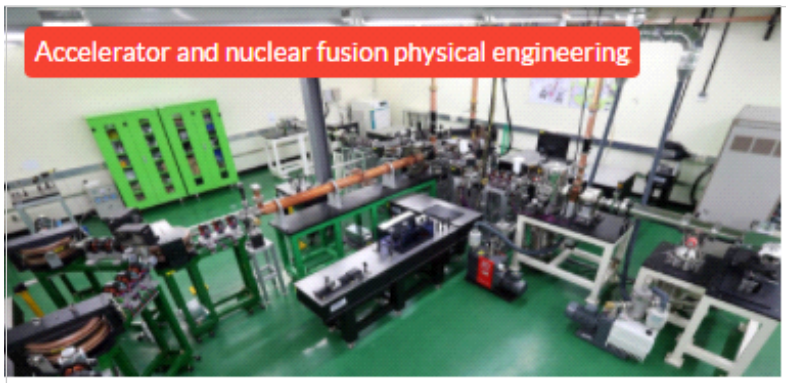
#Security #Datamining #Communication #Network #Material #Electronics #Software #IT #Chemistry #Molecular

**Introduce**

The ICT Major consists of five concentrations, Computer Software, Advanced Device Technology, Information Security Engineering, Communication & Media Technology, and Network Technology. These cover all the research fields of the ETRI. Major lectures are composed of future-focused advanced subjects. Students who want to learn basic subjects can take additional lectures at a nearby graduate school. Through on-site research, this major helps students develop their research capabilities so they can work on sophisticated government-led projects.

| 세부 전공명 | 전공내용 |
|---|---|
| Communication & Media Technology | Telecommunication Media Engineering is an advanced communication technology that can be applied to Beyond 5G mobile communication, high speed narrow area wireless communication, IoT transmission, tactical defense communication, next generation broadcasting media, terrestrial and cable TV broadcasting system, UHDTV broadcasting technology, broadcasting communication convergence technology, satellite communication and realistic satellite broadcasting technology, satellite navigation, Public safety disaster relief communications, wireless transmission and RF technology, and antenna & radio technology. In this course, students will acquire basic mathematical and engineering knowledge required for wireless mobile communication, digital broadcasting, satellite communication broadcasting and radio technology, as well as acquire professional knowledge through on-the-job training that directly participates in technology development projects. |
| Information Security Engineering | Information Security Engineering is a major field of research on how to actively counter the side effects such as invasion of privacy and cyber-attack that are caused by the evolution into the hyper-connected society. The aim of our department is to research and develop intelligent information security technologies including cryptography, authentication technique, network security, IoT security, and convergence |
| Network Technology | We cultivate Network Technology major of talent aiming for the hyper-connected telecommunications in theory and in practice.The curriculum provides classes and field-studies on network theory, IoT, future Internet, communication protocol and service, immersive multimedia communication, optical communication, and the newest technologies to meet convergences evolving in networks. |
| Advanced Device Technology | The Advanced Device Technology major embraces its goal of educating global R & D leaders in new materials and new electronic and functional devices. Related research fields are organic/inorganic photovoltaic technologies, transparent electronic devices, OLED lighting, organic electronic devices, new functional devices, high-frequency optical-wireless convergence components, photonic integrated circuits, optical components, thermoelectric technology, energy harvesting technology, nanoelectronic device technology, etc. |
| Computer Software | In Computer Software major, various software technologies needed to enter 4th industrial revolution and AI society are studied. The major includes embedded software, image processing, computer vision, machine learning, big data technology, spoken language processing, human robot interaction, contents, and IT convergence technologies. Students in this major can participate in various projects of Software Contents Research Laboratory and Hyper-connected Communication Research |

# Accelerator and Nuclear Fusion Physical Engineering




**Host School/Campus**

Korea Atomic Energy Research Institute

**Participating Schools/Campus**

Korea Institute of Fusion Energy

**tag**

#Accelerator #NuclearFusion #Nuclear #Fusion #Physics #Engineering #Plasma #Dynamics #Laser #Quantum

**Introduce**

In this major, the Korea Atomic Energy Research Institute, Korea Institute of Geoscience & Mineral Resources and National Fusion Research Institute come together to provide basic and advanced education about particle beams, optics, and plasma required for the development of high-tech equipment such as accelerators, ultra high energy lasers, and nuclear fusion devices.

# Mineral & Groundwater Resources


**Host School/Campus**

Korea Institute of Geoscience & Mineral Resources

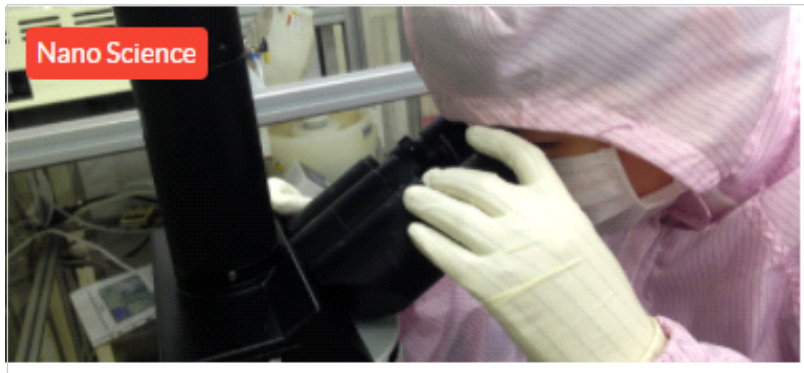
**tag**

#Mineral #Groundwater #Resource #Mineralogy #Geology #Geochemisty #Geophysics #Exploration #Hydrology #Environment

**Introduce**

Mineral and groundwater resources are essential for the living and the economic development of the nation. In particular, ensuring the continued existence of strategic minerals and underground water in response to climate change is vital for both securing industrial ingredients and energy and preserving the environment. The objective of this major is to cultivate experts who can lead the mineral and water resource industries by conducting research and developing technologies related to domestic and overseas surveys and explorations.

# Nano Science




**Host School/Campus**

Korea Research Institute of Standards and Science

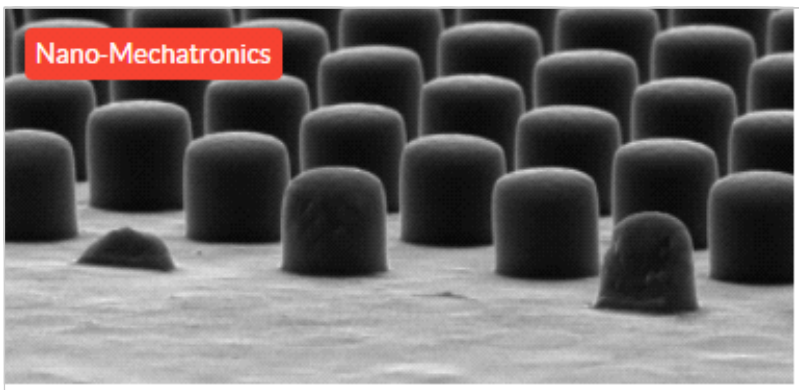
**tag**

#Nano #Science #Measurement #Physics #Chemistry #Material #Engineering #Device #Particle #Convergence

**Introduce**

The goal of Nano Science Major is to cultivate talented individuals who can think in an integrated way based on an expansive understanding of nano-measurements achieved through both experimental and theoretical study. Considering the characteristics of convergence sciences including physics, chemistry, materials, and biology, this major encourages students to utilize their expertise in different fields such as materials, safety, equipment, nano-bio, or quantum technologies.

# Nano-Mechatronics




**Host School/Campus**

Korea Institute of Machinery & Materials

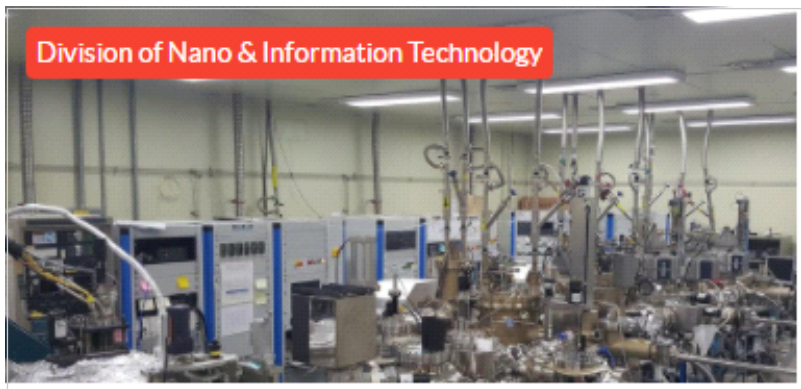
**tag**

#Nano #Mechatronics #Process #Optic #Structure #Technology #Engineering #Nanoimprint #Nanopatterning #Material

**Introduce**

The Nano-Mechatronics Major provides education on basic and in-depth subjects which are necessary to conduct nano-mechatronics research to develop comprehensive technologies related to nano-imprint-based nano-patterning processes and equipment, nano-component assembly technologies, and nano-measurement technologies. This major cultivates nano process/equipment/measurement technology experts by teaching applied technologies which can be immediately transferred to the industrial sector.

# Division of Nano & Information Technology




**Host School/Campus**

KIST School

**Participating Schools/Campus**

Korea Institute of Geoscience & Mineral Resources Korea Research Institute of Standards and Science

**tag**

#Nano #Material #Quantum #Energy #Bio #Robotics #Media #Interaction #Information #Intelligence

**Introduce**

The Nano & Information Technology Major has two concentrations, Nanomaterials Science & Engineering and HCI & Robotics. Nanomaterials Science & Engineering provides an education focused on the creation of new properties using nanomaterials and their engineering applications. HCI & Robotics provides education on HCI for application on the computers of the future, the principles of robotics, and a wide range of their applications. The goal of this major is to cultivate talented individuals with practical job competencies and expertise in nano and information technology.

| 세부 전공명 | 전공내용 |
|---|---|
| Nanomaterials Science & Engineering | NSE aims at providing prospective professional researchers with higher education that can help them to develop a specialized background and the R&D competence required to solve significant problems in engineering applications and to successfully explore diverse solutions based on understanding of nonlinear, unusual, or new properties of materials with respect to their nano-scale structures. |
| HCI & Robotics | The students in this major are expected to acquire a fundamental knowledge in the major subjects of HCI and Robotics, such as immersive virtual reality, physics based simulation, media and internet technology, multimodal perception and interaction, robot perception and actuation, knowledge representation and reasoning, human-robot interaction, and mechanism design. Also, they are expected to gain practical experience to meet the challenge of future cutting-edge technology by participating in national projects in HCI & Robotics. |

# Geophysical Exploration


**Host School/Campus**

Korea Institute of Geoscience & Mineral Resources

**tag**

#Nano #Mechatronics #Process #Optic #Structure #Technology #Engineering #Nanoimprint #Nanopatterning #Material

**Introduce**

In this major, students detect and visualize mineral resources, underground water and buried archaeological remains, and research non-destructive underground structure investigation methods to resolve a variety of underground issues. In addition, students may suggest the development of new conceptual exploration equipment through convergence with the latest IT technologies for a wider application of in-depth on-site technologies, and may get their measurements more quickly across a wide area using a helicopter.

# Radiation Science and Technology


**Host School/Campus**

Korea Atomic Energy Research Institute

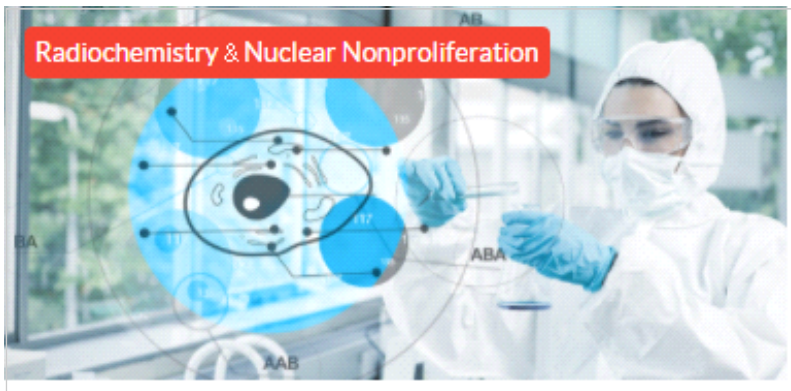
**tag**

#Radiation #Isotope #Radioisotope #Biotechnology #Biology #Biochemistry #Molecular #Gene #Protein #Cell

**Introduce**

This major consists of a basic research curriculum and applied research curriculum. In the basic research curriculum, students analyze organisms' radioresponses from a molecular biological, genetic engineering and biotechnical standpoint.
In the applied research curriculum, students develop advanced materials and technologies for bioindustries using radiation and radioactive isotopes.

# Radiochemistry & Nuclear Nonproliferation




**Host School/Campus**

Korea Atomic Energy Research Institute

**tag**

#Radiochemistry #Radiation #Chemistry #Nuclear #Nonproliferation #Environment #Material #Decommissioning #Measurement #Physics

**Introduce**

This major is Korea's only radiochemistry major. It provides education related to radiochemistry analysis, nuclear energy, and nuclear nonproliferation by utilizing its experts and specialized equipment.

# Petroleum Resources Technology


**Host School/Campus**

Korea Institute of Geoscience & Mineral Resources

**tag**

#Petroleum #Resource #Technology #Engineering #Exploration #Geology #Sedimentology #Seismic #Reservoir #Analysis

**Introduce**

The goal of the major is to cultivate experts in petroleum resources and to research new technologies in various relevant fields. The major covers petroleum geology to study the generation and preservation of petroleum gas, geophysics to find promising structures holding petroleum gas, drilling technologies to drill promising structures, petroleum engineering to study optimized development and industrial technologies, and the petroleum economy to evaluate the value of oil fields.

# Industrial Technology


**Host School/Campus**

KITECH School

**tag**

#GreenProcess #Process #System #Robotics #Virtual #Electric #CriticalMaterials #Material #Semiconductor #Packaging

**Introduce**

The Industrial Technology Major offers three concentrations intended to cultivate experts in Korea’s key industries and the quaternary sector of the economy such as robotics, industrial materials, smart manufacturing, green processes and energy systems.

- In Robotics, students learn about robotic technologies that are being utilized in the field through multi-disciplinary convergence research on topics such as machinery, electricity, electronics, and IT. This concentration is provided at the regional divisions located in Ansan and Gwangju.

| 세부 전공명 | 전공내용 |
|---|---|
| Robotics | Robotics is an interdisciplinary study composed of mechanical, computer and electrical engineering as well as information technology for the purpose of developing robots to accomplish tasks in place of people. You will learn about advanced technology such as environment recognition, decision making and intelligence, manipulation, navigation and human-robot interaction. Our department is aiming to cultivate experts who have the ability to develop service, field and manufacturing robots that function in real environments. |
| Industrial Materials and Smar t Manufacturing Engineering | Industrial material and Smart manufacturing engineering aims at the virtuous cycle structure of the scarce material industry for advanced rare metals such as metals and ceramics which are in short supply compared to the industrial demand of Korea's main industry and new growth engine industy. |
| Green Process and Energy Sy stem Engineering | Green Processes and Energy system engineering studies clean-material processes and high-efficiency energy technologies to solve energy, industrial resources and pollution problems, which are the most important issues in modern society. In the field of energy, resources and environment, we will improve the existing energy and raw material production system more environmentally by applying clean technology, and study the technology of clean production and high energy efficiency using unused resources such as biomass, low grade fuel, There is. |

# Advanced Energy and System Engineering


**Host School/Campus**

Korea Institute of Energy Research

**tag**

#AdvancedEnergy #Energy #Technology #Hydrogen #Fuel #Cell #Material #Clean #Greenhouse #Gas

**Introduce**

Advanced Energy and System Engineering consists of five research fields: hydrogen energy, fuel cells, energy materials, clean fuel, greenhouse gases, and high-efficiency energy systems. This major encompasses research on hydrogen and fuel cell technologies, new energy materials, fossil fuel conversion, greenhouse gas capturing, use and storage, and core technologies relating to efficient energy use and system operation. In addition, it handles engineering technologies relating to the energy field in general.

# Advanced Nuclear System Engineering


**Host School/Campus**

Korea Atomic Energy Research Institute

**tag**

#AdvancedNuclear #Nuclear #System #Engineering #Safety #Fusion #Technology #Atom #Reactor #Measurement

**Introduce**

This major provides practical technology education so that students can develop their competences in developing advanced and future-oriented technologies for new nuclear energy systems with outstanding safety and economic feasibility as well as technologies for extant systems.

# Quantum Energy Chemical Engineering


**Host School/Campus**

Korea Atomic Energy Research Institute

**tag**

#Quantum #Energy #Chemistry #Engineering #Nuclear #Cycle #Material #Technology #Hydrogen #Fuel

**Introduce**

This major covers radioactive waste processing and disposal technologies and nuclear fuel cycle technologies such as pyroprocessing for spent nuclear fuel, which can enhance the safety and economic feasibility of nuclear power.

# Medical Physics


**Host School/Campus**

Korea Research Institute of Standards and Science

**tag**

#Medical #Physics #Radiation #Laser #Ultrasound #Electronic #Bio #Bioelectricity #Biomagnetism #Cognition

**Introduce**

Medical Physics Major aims to cultivate experts with global competitiveness and technologies who can handle practical work, research, and the development of high-tech medical measurement technologies, such as supersensitive sensors, new conceptual medical instruments, and radiation, in the medical field and the medical instrument industry. The major provides an education on multi-disciplinary subjects related to medical engineering and measurement science associated with physics and a variety of engineering fields. Students receive a hands-on R&D education.

# Energy and Power Conversion Engineering


**Host School/Campus**

Korea Electrotechnology Research Institute

**tag**

#Energy #Conversion #Engineering #Electric #Power #Fuel #Signal #Digital #Process #Design

**Introduce**

The Energy and Power Conversion Engineering Major deals with technologies for converting different types of energy (electricity, machinery, and chemistry) into a form that consumers want, technologies to store energy in different forms, and technologies to deliver electric energy to consumers. Participatory majors consist of electromagnetic energy conversion, electric power conversion, and new and renewable energy. The purpose of the major is to cultivate field-oriented talent who can utilize their expertise in energy conversion to develop state-of-the-art science and technology as well as advanced industrial technologies.

# Resources Recycling


**Host School/Campus**

Korea Institute of Geoscience & Mineral Resources

**tag**

#Resource #Recycle #Engineering #Recycling #Metal
#Waste #Process #Technology #Chemistry #Thermodynamics

**Introduce**

The Resources Recycling Major is intended to develop technologies and expertise in converting different industrial waste resources, which are generated as a result of economic, social, or cultural changes, into new resources. Students here grow into science and technology leaders through a variety of lectures including basic studies, separation and sorting, wet recovery, and high temperature extraction.

# Renewable Energy Engineering


**Host School/Campus**

Korea Institute of Energy Research

**tag**

#RenewableEnergy #Energy #Engineering #Solar #WindPower
#Electric #Bio #Design #Geothermal #Therm

**Introduce**

Students learn the types and properties of clean renewable energy sources (unutilized clean energy such as solar heat, solar PV, geothermal heat, wind power, bioenergy, fuel cells and waste heat), and develop the ability to apply their expertise to the field. Students develop into global renewable energy experts with practical job competencies and are capable of designing hardware and software as well as evaluating using renewable energy sources.

# Electro-functionality Materials Engineering


**Host School/Campus**

Korea Electrotechnology Research Institute

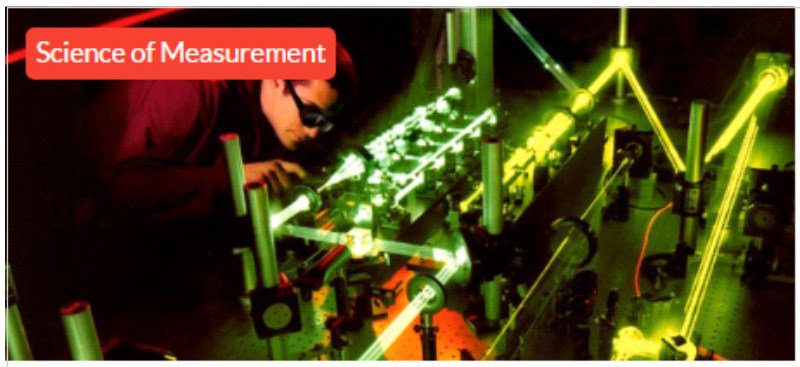
**tag**

#Material #Engineering #Device #Module #Superconduct #Battery #Cell #Nano #3D #Electric

**Introduce**

This major handles materials, devices, and module technologies to enhance the efficiency and stability of electric energy and to ensure a future with green power sources. This major covers a wide range of technologies such as core material and device technologies for thinner, more efficient, higher density, and lower priced power equipment, nanotechnology based electrical parts and material technologies for eco-friendly and high-functioning electrical and electronic devices, lithium batteries and lithium ion capacitors for high-efficiency energy conversion and storage, and eco-friendly green energy sources. The major aims to cultivate experts who can lead the government's Green New Deal policy by developing and commercializing higher value-added technologies.

# Science of Measurement




**Host School/Campus**

Korea Research Institute of Standards and Science

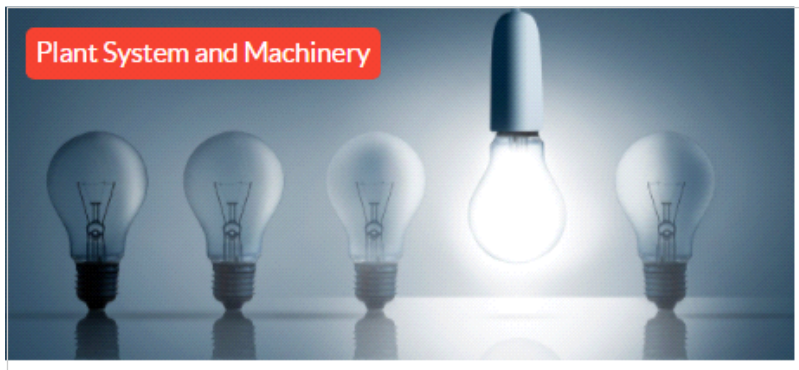
**tag**

#Science #Measurement #Standard #Optics #Physics #Metrology #Material #Technology #Photometry #Radiometry

**Introduce**

Science begins with measurement. It naturally follows that progress in science is vitally dependent on the development of measurement techniques. The purpose of our curriculum is to train and nurture scientists skilled in leading-edge measurement techniques, especially in the areas of optical technology, mechanics, and electromagnetics. The topic of evaluation of measurement uncertainties is required in common in all scientific measurements, and is taught as an elementary subject. Advanced subjects are structured differently depending on the research area and are selected according to the student's interests and the advisor's recommendation. The area of optical technology offers subjects such as nonlinear optics, quantum optics, and optical frequency metrology. Subjects in the area of mechanics include experimental mechanics, tactile sensing, and vacuum engineering. These tutorial-based subjects go in hand with practical training involving hands-on work in lab experiments. The demand for scientists with measurement expertise is increasing with the development of science and technology. Students who complete the curriculum can expect to further their careers by working in fields related to measurements and standards in industry, government labs, and academia.

# Plant System and Machinery




**Host School/Campus**

Korea Institute of Machinery & Materials

**tag**

#Plant #System #Machinery #Engineering #Thermodynamics #Process #Design #Control #Production #Transformation

**Introduce**

In this major, students, use thermo-fluid machinery technologies to study and research safety and reliability technologies, key equipment technologies, and energy plant process design technologies related to energy production, conversion, and utilization. Students select an advanced course such as plant process design in order to cultivate practical plant engineering expertise. Later, they can go into a variety of machinery industry fields as plant process and machinery design and operation experts.

# Korean Convergence Medicine


**Host School/Campus**

Korea Institute of Oriental Medicine

**tag**

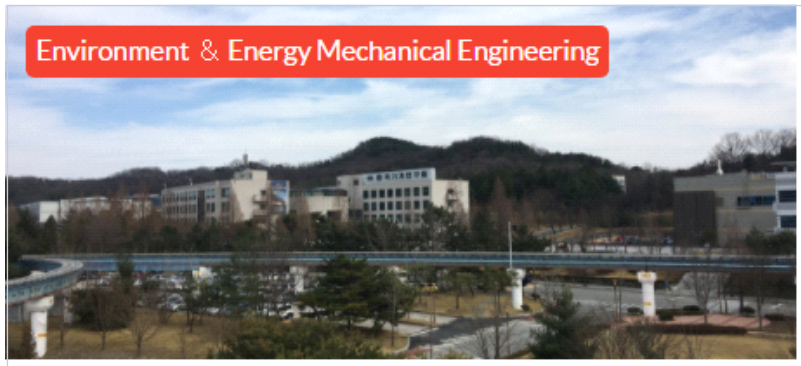
#KoreanMedicine #Medicine #Life #Science #Technology #Health #Biology #Physiology #Pathology #Pharmacy

**Introduce**

Students majoring in Korean Convergence Medicine are taught by faculty members with expertise in the multiple disciplines required for the development of Korean medicine. The major aims to cultivate the talent of the future who can converge Korean medicine, physics, (biomedical) engineering, life science, and (medicine) pharmacy. After graduation, students become Korean medicine/health care researchers, experts in herbal medicine, medical technologies, or medical instruments, etc.

Once students enroll in this major, they are assigned an academic advisor, considering their undergraduate majors, for their education and research. This major can be approached by all undergraduate majors. ((Korean) medicine, pharmacy (herbal medicine), veterinary medicine, engineering, statistics, physics, life science, psychology, etc.) All students can participate in research projects of interest. They develop their competence as researchers through thesis guidance and research.

# Environment & Energy Mechanical Engineering




**Host School/Campus**

Korea Institute of Machinery & Materials

**tag**

#Environment #Energy #Machinery #Engineering #Physics #Chemistry #Bio #Fuel #Cell #Plasma

**Introduce**

In Environment & Energy Mechanical Engineering Major, students study and research environmental machinery technologies to reduce particulate matter/greenhouse gases, renewable energy and clean fuel based machinery technologies such as fuel cells and gas turbines, eco-friendly/high-efficiency engine and automobile technologies that will be used in the future, plasma based energy/environmental machinery technologies, and environmental machinery technologies such as wastewater/purified water treatment. After graduation, students get jobs at companies or research institutes as environmental and energy machinery experts.