

Graduate School Academic Programs

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II . College of Information and Biotechnology

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College of Engineering



Department of Mechanical Engineering [ME]

Various mechanical systems developed with the principles and technologies of mechanical engineering have contributed greatly to human life and the development of the global economy. In the graduate program of Mechanical Engineering at UNIST, students learn the basic principles of advanced mechanical engineering, develop real mechanical systems, explore cutting-edge technologies, and seek real-world applications. The graduate program includes a wide variety of research fields such as thermodynamics, fluid mechanics, solid mechanics, dynamics, heat transfer, mechanical design, advanced manufacturing, micro/nano engineering, biotechnology, control and automation, acoustic engineering and tribological engineering.

Research Fields

- Solid Mechanics
- Control, Mechatronics & Robotics
- Manufacturing & Design
- Thermal Engineering & Heat transfer
- Fluid Mechanics
- Micro & Nano Engineering

Homepage

<http://me.unist.ac.kr/>

Department of Urban and Environmental Engineering [UEE]

Urban and Environmental Engineering is an interdisciplinary field of study that is dedicated to education and research on the resilient protection of natural and built environments against disasters, as well as the sustainable development of urban society. In this field, the students will learn fundamental knowledge associated with urban and environmental issues and will explore advanced courses categorized into three major programs: (1) Environmental Science and Engineering, (2) Urban Infrastructure Engineering, (3) Disaster Management Engineering. The Department of Urban and Environmental Engineering at UNIST is committed to developing innovative technologies in the related fields and cultivating future leaders who will make a huge impact on our profession and society.

Research Fields

- Environmental Science and Engineering
- Urban Infrastructure Engineering
- Disaster Management Engineering

Homepage

<http://uee.unist.ac.kr/>

Graduate School of Semiconductor Materials and Devices Engineering [SE]

The Graduate School of Semiconductor Materials and Devices Engineering has been established to meet an increasing demand for semiconductor research towards applications in IoT, big data and artificial intelligence. The school provides a wide range of research and education experience from the fundamental academic to industry-oriented research.

Research Fields

- Next-generation Semiconductor Materials
- Future Display Materials
- Characterization of Semiconductor Materials/Devices

Homepage

<http://se.unist.ac.kr/>

Department of Materials Science and Engineering [MSE]

The Department of Materials Science & Engineering fosters the next generation leadership through self-motivated and interdisciplinary research and education, leading the field as a frontier for the cutting-edge technology boosted by in-depth fundamental and practical research. Our research and education philosophy is built on a balanced focus on fundamental understanding and applied practice of all material classes covering metals, ceramics, polymers, and composites with a special emphasis on next generation semiconductor materials and devices and advanced materials science. Our community members, trained by the courses based on out-of-textbook thinking and problem-solving-oriented approach, will be able to contribute to the society with creative and beneficial engineering solutions to the contemporary material issues.

Research Fields

- Energy Efficient Data-Storage Technology for the Next-Generation Semiconductors
- Electronic Materials & Devices
- Wearable Electronics & Programmable Materials
- Next Generation E-ink Material and Printing Process for Printed Electronics
- Optoelectronic Materials & Devices
- Nanomaterials
- Organic/Inorganic Hybrid Nanomaterials & Devices
- Energy Conversion and Harvesting Materials and Devices
- Superlight and High Resistive Metallic Materials
- Advanced Characterization

Homepage

<http://mse.unist.ac.kr/>

School of Energy and Chemical Engineering [ECHE]

Graduate program of Energy Engineering provides exciting and unique opportunities that deal with production, conversion, storage, and efficiency of energy, and alternative energy technologies from a basic concept to practical technology. We combine courses from chemistry, electrochemistry, polymer, ceramics, physics, and materials engineering to create a strong knowledge base essential to success in energy-related areas. Students have the opportunity to take course and research focused on specific energy research subjects that include solar cell, fuel cell, battery, and other energy-related devices and materials. Along with research activities, students will be well-prepared for career focused on energy science and engineering and creatively apply their knowledge to confront the global challenges of energy supply and demand.

Graduate program of Chemical Engineering aims to be a world-leader. Regarded as one of the finest institution in Korea, this school provides its graduate students with a state-of-the-art research environment and facilities. We focus on the application of chemical engineering to a variety of specific areas, including energy and the environment, catalysis, reaction engineering, systems and process design, nano technology, polymers and colloids and biotechnology. It is a multi-scale engineering school in which students can learn about the creative design of new chemicals, materials, processes and systems by translating molecular level information into novel engineering principles. Faculty members are involved in cutting-edge research programs that encompass all areas of chemical engineering: Nanoscience, Materials Science, Catalysis, Electronic Materials and Devices, Colloidal Science and Chemical Engineering. The graduate students and post doctoral researchers will have access to state-of-the-art facilities on campus, such as the UCRF and Chemical Sciences Facility.

Graduate program of Battery Science and Technology provides students with a sound basic and practical engineering knowledge-base overlaid with established and emerging battery technology learning through in-depth discussions and laboratory experiments. We focus on the application of scientific principles to design and fabricate novel next generation battery system, which is a key aspect of today's green technology such as portable electronics, electric vehicles, and 'smart grid' power distribution. In order to make significant breakthrough in battery technology, we also make a good effort to understand scientific phenomena such as charge and ion transport, and crystallographic transition of materials based on the fundamental electrochemistry and solid state chemistry. Studying a graduate program of Battery Science and Technology at UNIST offers students a firm professional basis in both of academia and industry.

Research Fields

- Solar cell
- Energy Materials
- Catalysts
- Materials/Devices
- Biorefinery
- Modeling and Simulations
- Battery Science and Technology

Homepage

<http://eche.unist.ac.kr/>



Department of Nuclear Engineering [NE]

Department of Nuclear Engineering currently comprises of ten research laboratories: each lab focuses on their unique research themes, including, but not limited to, reactor physics and innovative core design, nuclear power plant (NPP) decontamination and decommissioning (D&D), corrosion behavior of nuclear reactor materials, design and safety analysis of next generation NPP systems, accident-tolerant fuel (ATF) design and radiation-resistant material development, advanced fuel cycle applicable for next generation reactors with much less concern on nuclear proliferation, NPP risk assessment and autonomous operation, high accuracy high speed plasma simulations in fusion reactor such as Korea superconducting Tokamak advanced research or KSTAR. Recently, we brought the two next big things to our department: one is the 'research center for NPP decommissioning technology development' and the other is 'Micro Nuclear Energy Research and Virtual Arena (MINERVA)', also a research center for Micro Modular Reactor (MMR) development for naval applications, such as ice-breakers and submarines. We are standing at the cutting-edge of nuclear engineering research and technology development in our country and will keep leading the Korean nuclear society to a certain extent, in friendly cooperation with many other entities in the society, which will be the future work places for our students and researchers.

Research Fields

- Nuclear Reactor Physics
- Thermal·Hydraulic & Reactor Safety
- Nuclear Fuel
- Nuclear Materials
- Nuclear Fuel Cycle
- Radiation Engineering

Homepage

<http://nuclear.unist.ac.kr/>

Graduate School of Carbon Neutrality [CN]

The Graduate School of Carbon Neutral Institute of UNIST is aiming at cultivating talents of science and technology to realize 2050 carbon neutrality, and offers various interdisciplinary education and research programs including carbon capture/utilization/storage (CCUS), hydrogen production/storage/transportation (PST), resource circulation, and new and renewable energy. Through innovative education and research programs to foster convergence talents, students can grow into world-class carbon-neutral experts and play a leading role in domestic and international carbon-neutral research fields.

Research Fields

- CCUS (Carbon Capture, Utilization, and Storage)
- Hydrogen
- Renewable Energy
- Environmental Managing Policy

Homepage

<http://cn.unist.ac.kr/>

College of Information and Biotechnology



Department of Design [Design]

Situated within one of Korea's prestigious national institutes of science and technology, UNIST Design nurtures professionals and researchers capable of leading the field and shaping the future of design and technology. You will acquire design knowledge and skills in intensive courses, as well as work in a lab to conduct rigorous academic research and solve real-world problems with SMEs, companies, public-sector organizations, and research institutions. Find out more about your future professors and labs on the website.

Research Fields

Product Experience

- User Experience
- Ergonomics
- Human-computer Interaction

Product/Service Design

- Design Aesthetics
- Artefact Manifestations
- New Product/Service Development

Integrated Design & Engineering

- Design Theory & Methods
- Design Tools and Techniques
- Engineering Design

Homepage

<https://design.unist.ac.kr/>

Department of Biomedical Engineering [BME]

The Graduate Program of Biomedical Engineering (BME) offers interdisciplinary research and education opportunities across engineering, medicine, and life sciences, to develop technologies that make our society healthier. The program pursues the convergence between various science and engineering subjects while allowing students to develop practical research methods and problem-solving skills through in-depth discussion and practice on each research topic. BME faculties have done world-renowned research in biomedical imaging, brain & cognitive engineering, rehabilitation & regenerative engineering, personalized diagnosis & treatment, genomics and bioinformatics, and digital healthcare. Our graduate program is designed to help students grow into global leaders in both academia and the industry of biomedical engineering.

Research Fields

- Biomedical Imaging
- Brain and Cognitive Engineering
- Rehabilitation and Regenerative Engineering
- Precision Nanomedicine
- Genomics and Bioinformatics
- Digital Healthcare

Homepage

<http://bme.unist.ac.kr/>

Department of Biological Sciences [BIO]

The Graduate Department of Biological Sciences offers interdisciplinary research training based on fundamental understandings on living organisms and applied knowledge to medical science in order to improve quality of life. The department provides world-class research environments for biological and medical sciences, such as a state-of-the-art Animal Research Center, Optical Biomed Imaging Center, Cancer Research Center, and Metabolic Disease Research Center. We aim to produce young, brilliant, and creative scientific minds, with world-class renown by educating them, so they are fully equipped and familiar with the basic knowledge of biological and medical sciences as well as cutting-edge research technologies in the state-of-the-art facilities provided by UNIST.

Research Fields

- Cancer biology
- Immunology
- Medical life information science
- Microbiology
- Molecular cell biology
- Neurobiology
- Stem cell biology
- Structural biology

Homepage

<http://bio.unist.ac.kr/>

Department of Industrial Engineering [IE]

The Department of Industrial Engineering (IE) in UNIST pursues education and research that promote the effectiveness and efficiency of decision-making within the industry based on data. It aims to cultivate the top-notch of data science experts to solve the decision-making problems in various industries such as healthcare, manufacturing, logistics, energy, and finance by combining scientific methodologies such as statistical analysis, data mining, machine learning, and deep learning. UNIST IE provides advanced courses for data analysis and optimization as well as industry projects to help you to be equipped with both knowledge and real problem-solving skills.

Research Fields

- Data Analytics
- Optimization
- Financial Engineering
- Blockchain-based Data Security
- Artificial Intelligence

Homepage

<http://ie.unist.ac.kr/>

Graduate school of Artificial Intelligence [AI]

The Graduate School of Artificial Intelligence (AI) aims to nurture world-class talented students leading the era of the 4th industrial revolution and conduct research from core AI technologies to AI-based convergence (AI+X) applications. We offer a curriculum for the master's and doctoral degree programs specialized in the fields of core AI theories and technologies, AI systems/HW, and AI+X applications for manufacturing, chips, mobility, and healthcare. We also study and develop all aspects of intelligent machines and systems for diverse applications. Our research topics include the architecture of intelligent agents, knowledge representation and automated reasoning, trustworthy AI, causal inference, planning and acting in the real world, AutoML, deep learning, reinforcement learning, natural language processing, computer vision and robotics.

Research Fields

- Core AI theory and technology
- AI systems/HW
- AI+Manufacture, AI+chips, AI+Mobility, AI+Healthcare

Homepage

<http://aigs.unist.ac.kr/>



Department of Electrical Engineering [EE]

Department of Electrical Engineering (EE) of UNIST focuses on various electrical engineering research fields including Electronic and Photonic devices, Integrated circuits, Electromagnetics, Power electronics, Communications and networking, Control and robot systems, Signal processing and Artificial intelligence which are essential technologies for future 4th industrial revolution. With more than 20 professional faculty members, many graduate students are participating in global-level researches of all electrical engineering fields. The electronic and photonic device group considers research topics such as CMOS devices, healthcare sensors, optical communications which are fundamental materials/devices for electrical engineering. For the integrated circuit design group, almost all topics for designing efficient and high-performance chips which work as brains of all electrical devices of 5G communications, artificial intelligence systems and internet of things are considered. Our faculties in the electromagnetics research group handle issues for electric signals on all frequency bands such as antenna array technologies, THz future communication technologies, etc. The group of power electronics considers wireless power transfer technologies, power converter designs and all related topics for powering electronic devices and systems. Our research group named communications and networking covers all key technologies for intelligent/future communications and networks which will be used to provide intelligent services such as autonomous driving, AI applications in both wireless and wired manners. The control and robot systems group researches all control and optimization technologies for future mobilities, robot systems, autonomous driving cars which are very promising future IT industries. For the last, the signal processing research group develops key signal and image processing technologies for artificial intelligent systems, medical imaging, 3D vision applications and even for deep learning algorithms. After applying our graduate course, students can participate in very promising and interesting IT research fields which make, change and lead the world. After graduation, students will get opportunities for applying to Samsung, LG electronics, SK hynix and other global companies such as Qualcomm, Google, Apple, etc.

Research Fields

- Communications and Networking
- Integrated Circuit Designs
- Signal Processing
- Antenna/Packaging
- Robotics and Control
- Wireless Power Transfer
- Electronic Devices
- Photonic Devices

Homepage

<http://ee.unist.ac.kr/>

Department of Computer Science and Engineering [CSE]

The field of Computer Science and Engineering deals with the theories and SW/HW technologies that are improving the quality of our lives. From deep learning that is revolutionizing computing to networks that connect everyone and everything and to big data and cloud computing that provide the infrastructure to support the anticipated changes of the future, the Department of Computer Science and Engineering is involved in cutting-edge developments that are happening now and into the future. Our vision is not only to advance the state of the art in emerging SW/HW technologies which will benefit humankind, but also to raise future global leaders who can innovate and create new software industries in Korea and worldwide. Our graduate program focuses on cultivating the finest researchers that have the ability of conducting highly creative and innovative research and creating high-quality computing solutions.

Research Fields

- Computer Architecture
- Compiler
- Database
- Operating Systems
- Parallel and Distributed Computing
- Computer Networks
- Scientific Computing
- Artificial Intelligence
- Neural Network and Machine Learning
- Computer Vision, Image Processing, and Computer Graphics
- Information Retrieval and Data Mining
- Natural Language Processing

Homepage

<http://cse.unist.ac.kr/>

College of Natural Sciences



Department of Physics [PHY]

Physics forms a fundamental knowledge system on nature and a framework of 'thinking' for almost every other contemporary science and technology. The physics department at UNIST aims to perform cutting-edge fundamental research in physical sciences and provide a ground basis for the development of next-generation technologies. The department focuses on the three main research areas, including plasma and beam physics, quantum materials and optical physics, and soft matter and biological physics. The department provides graduate students with the deepest level of physics courses and educates them to become world-leading physicists.

Research Fields

- Plasma and Beam Physics
- Astrophysics
- Soft Matter Physics
- Biological Physics
- Condensed Matter Physics
- Optics

Homepage

<http://physics.unist.ac.kr/>

Department of Mathematical Sciences [MTH]

Department of Mathematical Science explores the connections between mathematics and its applications at both the research and educational levels. In addition to focusing on traditional study in pure mathematics, our research at UNIST is devoted to encompass some of the most diverse and interdisciplinary research in the physical, business, economics, engineering, and biological sciences. The department provides a dynamic and engaging research environment in scientific computing, mathematical biology, finance, dynamical systems, image processing, number theory and analysis in PDEs.

The undergraduate and graduate curriculum is planned with the following varied objectives: (1) to offer students an introduction to the fundamental study of quantity, structure, space, and change; (2) to prepare students for graduate study in pure or applied mathematics; (3) to serve the needs of students in fields that rely substantially on mathematics, such as the physics, biology, engineering, business and economics.

Research Fields

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|----------------------------------|------------------------------------|
| · Algebra | · String Theory |
| · Mathematical Analysis | · Quantum Field Theory |
| · Topology | · Supersymmetric Gauge Theories |
| · Geometry | · Mathematical Biology and Physics |
| · Applied Mathematics | · Machine Learning |
| · p-adic Galois representations | |
| · (Integral) p-adic Hodge theory | |
| · Automorphic representations | |
| · Calculus of variations | |
| · Nonlinear analysis | |

Homepage

<https://math.unist.ac.kr/>

Department of Chemistry [CHEM]

The department of Chemistry offers the programs for Master, Master-Ph.D. combined, and Ph.D degrees in all major areas of chemistry including organic chemistry, physical chemistry, analytical chemistry, biochemistry, materials and polymer chemistry, and nanoscience. Research projects that utilize state-of-the-art facilities under the mentorship of world-class researchers (28 in total, students to faculty ratio = 2) are available to all students and set in collaborative environments.

Graduate students have ample opportunities to participate in cutting-edge research programs in a research group of choice, through which one will develop creative thinking and problem-solving skills to become an independent researcher.

Research Fields

- Chemical Biology/Biomaterials
- Inorganic Chemistry
- Materials/Polymer Chemistry
- Organic Chemistry
- Physical/Theoretical Chemistry

Homepage

<http://chemistry.unist.ac.kr/>

School of Business Administration



The mission of the Master's/Ph.D. program in the School of Business Administration (SBA) is to educate intellectual, innovative, and analytically-minded scholars, who will contribute to the advancement of business education and research. The graduate program curriculum is designed to be extensive, flexible, personalized, and conducted in the self-initiated research environment. Our research tracks include strategic management (entrepreneurship, technology management), organizational behavior, marketing, management information systems, finance, financial engineering, accounting, economics, operations management and decision making, and business analytics. In the UNIST SBA, the graduate students are strongly encouraged to apply the up-to-date research methodologies in the field of Big Data and AI to a variety of management research areas.

Research Fields

- Strategic Management
(entrepreneurship, technology management)
- Organizational Behavior
- Marketing
- Management Information Systems
- Finance
- Financial Engineering
- Accounting
- Economics
- Operations Management
- Decision Making
- Business Analytics

Homepage

<http://management.unist.ac.kr/>