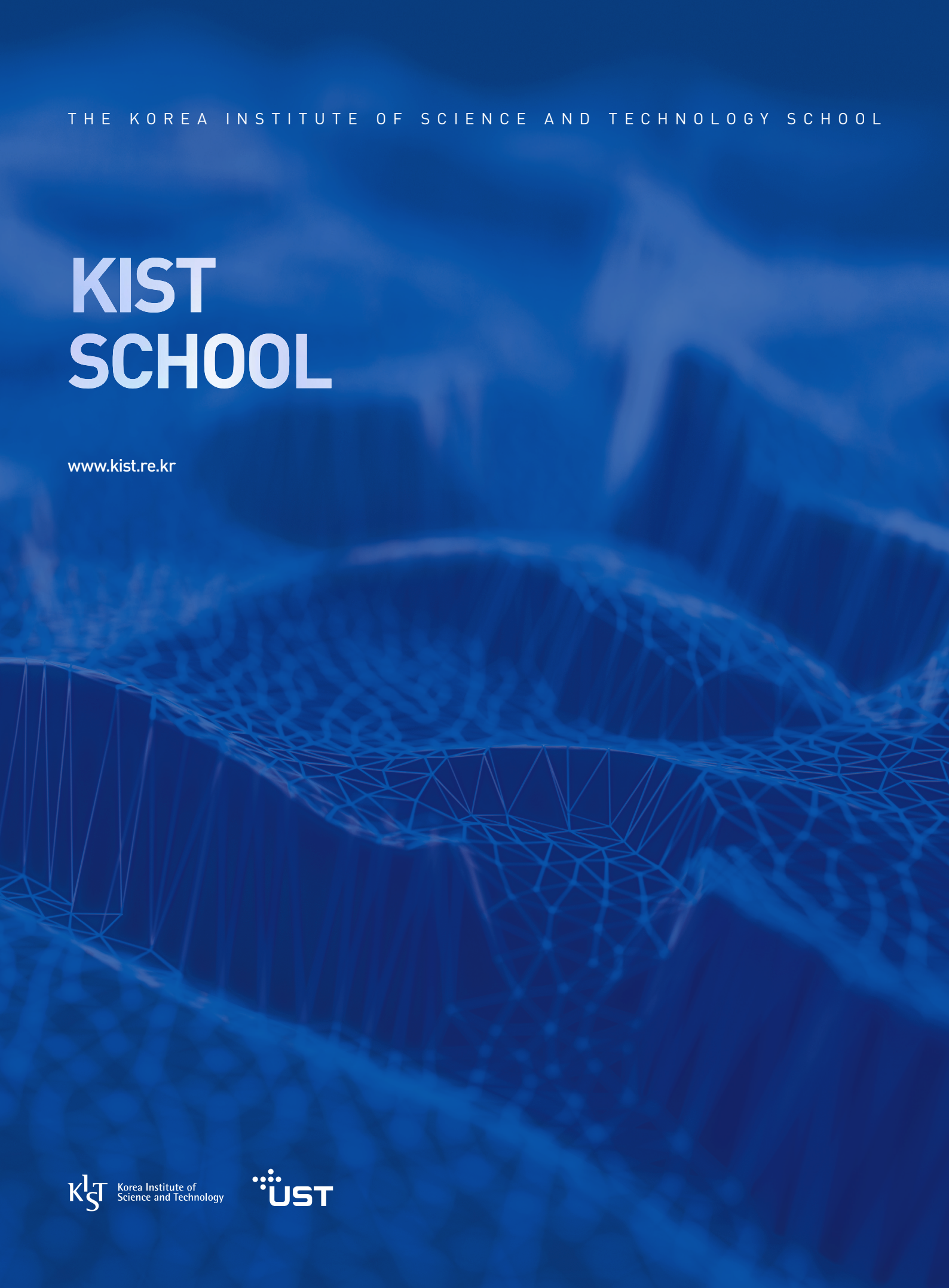
THE KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY SCHOOL

KIST SCHOOL

www.kist.re.kr



KIST Korea Institute of Science and Technology

UST

Korea Institute of Science and Technology

Welcome to the Korea Institute of Science and Technology (KIST), Korea's premier multidisciplinary research institute! Our mission is to create a brighter future and enhance the quality of life for all through the advancement of science and technology.

Formed in 1966, KIST was the first government–funded research institute to be established in Korea. As it was founded in the aftermath of the devastation caused by the Korean War, KIST's development has embodied Korea's own during that time. Back in 1960, when Korea embarked on its national development agenda and sought to create a new research institute, it was one of the poorest countries in the world. Today, however, Korea boasts the world's 11th largest economy, and this was possible in large part due to developments in the field of science and technology spearheaded by KIST.

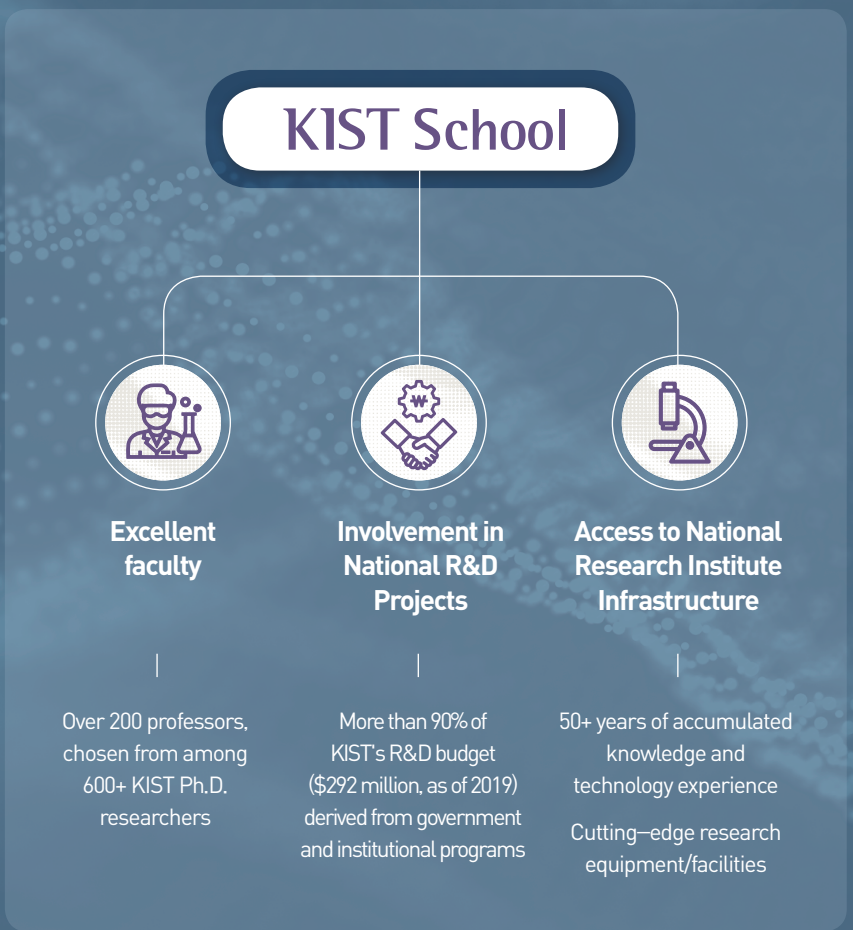
Focusing on frontier research and globally significant research agendas, KIST prioritizes large–scale, long–term, interdisciplinary R&D projects, seeking to push the boundaries of Korea's R&D capabilities in S&T and nurture promising young talent. This determination has led to KIST being internationally recognized for its contributions to S&T, with Reuters ranking it as the world's 6th most innovative research institution for the second year in a row in 2017.

In spite of this success, KIST has never lost sight of the significant role which foreign assistance had in its establishment. Moving forward, we hope to do our part and give back to the global community, through disseminating KIST's model of science–based official development assistance (ODA) to developing countries.

Change begins with education. In line with this ideology, KIST offers several unique graduate–level programs to equip its domestic and international students alike with the knowledge and practical research experience they need to succeed as scientists and engineers across a diverse range of specialized S&T areas. KIST School students are carefully selected to take part in R&D projects at KIST's research centers – projects that closely correspond with the students' respective fields of study. By enabling students to immerse themselves in S&T research under the experienced supervision of their advisors, KIST will foster a new generation of S&T leaders who are truly capable of creating a brighter future for all.

Korea Institute of Science and Technology School

Since 1991, KIST has dedicated itself to the education of talented young professionals. KIST School has taken full advantage of KIST's vast experience in the establishment and administration of graduate schools. The primary goal of KIST School is to educate future global leaders in S&T research. To accomplish that, we offer three interdisciplinary educational programs, backed by more than 50 years of top–notch research and educational experience.



Message from the President

Dear Students,

The Korea Institute of Science and Technology (KIST), established in 1966, was Korea's first government–funded R&D institute, laying the foundation for Korea's industrial development. Over the five decades since that time, KIST has also played a leading role in the implementation of a national–level system for promoting innovation, and provided support for the formation of 16 government research institutes focused in specialized research fields.

Looking ahead, KIST aims to make substantial contributions for future development using our accumulated research capabilities and achievements.

Under the philosophy that progress is entirely dependent on the creativity of our human resources, KIST also seeks to foster talented individuals in the science and technology fields through programs which are differentiated from those normally offered by academia.

To that end, beginning with the master's and Ph.D. tracks in 1990, Starting with the master's and Ph.D. courses, KIST began collaborating with universities in 1990 to operate various S&T talent training programs such as IRDA (International R&D Academy), UST (University of Science & Technology, and KU (Korea University)–KIST School. Focused on the convergence curriculum, it launched KIST School to become a hub education institution for global innovation and education systems.

Furthermore, in line with its agenda of broadening Korea's convergence research curriculum, KIST School was launched as an educational institution hub for global innovation and education systems. KIST School is poised to proactively respond to the rapid changes the future holds, by providing research–oriented educational opportunities focused on convergence technology, and fostering S&T talents that are in a league of their own for the future of our society.

Under our new vision, "Making the Future Today, GRaND KIST (Globally Recognized and Nationally Dedicating KIST)", KIST will strive to continue to be a world–class national research institute that actively contributes to making the excitement of the future a reality today.

Dr. YOON, SEOK-JIN
President

Seok Jin Yoon

Message from the Dean

Dear Prospective KIST School Students,

Thank you for your interest in KIST School!

KIST is a government–funded research institute in Korea which conducts R&D activities in several vital areas, including energy, the environment, national defense, materials, and health. KIST plays a central role in fostering industry–academic cooperation, which serves to advance research on convergence/complex technology, and establish a mutually strengthening link between industry and universities.

Utilizing the research capabilities and advanced S&T infrastructure that KIST has accumulated over the past five decades, in March 2017, KIST School was jointly formed by KIST and the University of Science and Technology (UST), for the purposes of training science and technology professionals and providing young researchers with unique research and educational opportunities.

As a hub for fostering innovative S&T talents, KIST School provides research–oriented education in the field of new convergence technology, and features three interdisciplinary major programs: bio–medical convergence, energy–environment convergence, and nano–information convergence. In addition, master's and Ph.D. students are trained using a system that links KIST's strengths its social problem–solving convergence research capabilities, and advanced research infrastructure. This enables KIST to be prepared for the rapidly changing landscape that the future holds, such as the 4th Industrial Revolution.

As part of our efforts to attract the very best talent from all over the world, we offer all students a full scholarship along with other stipends, as well as various educational benefits, including opportunities to participate in various research projects and acquire practical skills in the field of science and technology.

KIST also maintains one of the most well–balanced graduate programs in the country, with 2:1 student/faculty and 1:1 domestic/international student ratios. International students representing 28 different countries can work right alongside their Korean colleagues and enjoy the dynamic culture of Seoul while simultaneously influencing and inspiring each other to achieve academic excellence and become future global science and technology leaders.While the majority of the classes at KIST School are conducted in English, excellent Korean language programs are also available for international students, making it much easier for them to adapt to Korean culture and keep in touch with their fellow KISTians after graduation.

Although KIST School has made great progress in the field of international cooperation, we are always pursuing ways to push to new limits. For this reason, we recently launched the KIST School Internship Program, which allows us to further expand our cooperative network into Central Asia, Eastern Europe, and Southwest Asia.

Our goal is to make the world a better place for all humankind. KIST will endeavor to overcome the global challenges we face by scouting for pioneers of change.

Dr. LEE, HYUN JOO
Dean

Hyunjoo Lee

Status

We have students from 31 different countries and they are being educated by outstanding professors. The domestic/foreign student ratio is almost 1:1

Majors	Faculty	Students
❶ Bio-Medical Science & Technology	78	149
❷ Energy& Environment Technology	48	81
❸ Nano&Information Technology	68	76

(September 2020)

International Cooperation

We have partner countries to foster global leaders and to provide them with the highest quality education which will help them build up the capacities of their native countries.

- Thailand, Asian Institute of Technology (AIT) ('00)
- Ukraine, Nat'l Tech. U. of Ukraine Kiev Polytech Institute (NTUU-KPI) ('01)
- China, Lanzhou University ('04)
- Russia, Novosibirsk State Tech University('07)
- China, Peking University ('07)
- Belarus, Belarusian National Technical University ('13)
- Ukraine, National Technical University Kharkiv Polytechnic Institute ('15)
- Czech Republic, Czech Technical University ('15)
- Germany, Saarland University ('16)
- Czech Republic, Charles University ('16)
- Uruguay, National Research And Innovation Agency ('16)
- Japan, Tohoku University ('16)
- Indonesia, Universitas Indonesia ('16)
- Belarus, National Academy of Science of Belarus ('17)
- Mongolia, Mongolian Academy of Science ('17)
- Turkey, Scientific and Technological Research Council of Turkey ('18)
- Ukraine, Ministry of Education and Science of Ukraine ('19)
- Kazakhstan, Ministry of Education and Science of the Republic of Kazakhstan, CIP ('19)

Programs

Degree Program

Degrees
• Master's Program / Doctoral Program

Semesters
• Spring Semester begins in March, Fall Semester begins in September.

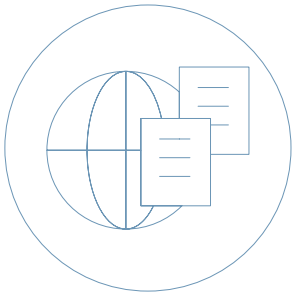
English Language Requirements for Admission

Minimum Scores Required						
Type	TOEFL			TOEIC	TEPS	IELTS
	iBT	CBT	PBT			
Score	79	213	550	730	630	6

※ All test scores should be dated within 2 years of the application deadline.

• Waiver of English score requirement
Applicants with a bachelor's degree or higher who studied for over a year in an English–speaking country such as the US, UK, Canada, Australia, New Zealand, Ireland, or South Africa.

Dual Degree Program

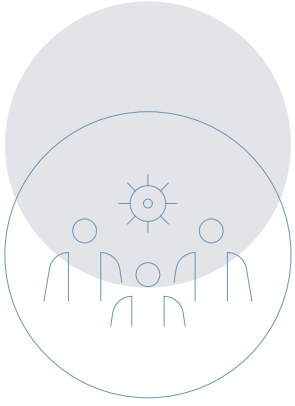


We have eleven partner countries to foster global leaders and to provide them with the highest quality education which will help them build up the capacities of their native countries.

Eligibility
• Applicants who have fulfilled their coursework requirements from Partner University with a cumulative GPA of at least 4.0 out of 5.0, will be entitled to enroll in the equivalent M.S. or Ph.D. degree program at KIST School.
• The required language is English. Students who have a TOEFL score of CBT 213 or higher or other equivalent scores such as IELTS or TOEIC will be considered qualified.

Period
• Spring Semester begins in March, Fall Semester begins in September.
• Students should study at KIST for at least one year for an M.S. or M.E. degree and two years for a Ph.D. degree.

Internship Program



KIST School provides 6 to 9 month–long internship of R&D training for outstanding applicants and it offers English classes plus a Korean language program.

Eligibility
• Current students at university, who is expected to receive a bachelor's or master's degree
• Be willing to apply for master's or doctorate degree at KIST School after finishing the internship

Period
• Runs two times a year, Begins in January and July

Majors-Chief major professor

Division of Bio-Medical Science & Technology
Park, Kwideok

Field of Research: Tissue engineering, Extracellular matrix (ECM) engineering, Stem cell bioengineering

82-2-958-5288
kpark@kist.re.kr

Division of Energy & Environment Technology
Jeong - Myeong Ha

Field of Research: Heterogeneous catalysis, Nanostructure design/ characterization, Biomass decomposition, Deoxygenated biofuels, Methane upgrading, Fluroinate refrigerants

82-2-958-5837
jmha@kist.re.kr

Division of Nano & Information Technology
Ahn, Sang Chul

Field of Research: HCI (Human Computer Interaction), Augmented Reality, IBMR (Image Based Modeling and Rendering)

82-2-958-5777
asc@kist.re.kr

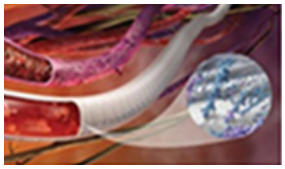
Division of Bio-Medical Science & Technology

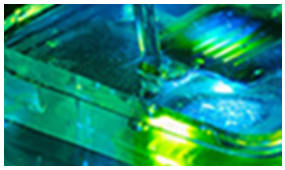
Bio-Medical convergence major covers multi-disciplinary fields which consist of three sub-majors including Biological Chemistry, Biomedical Engineering and Neuroscience. Biological Chemistry focuses on new drug discovery based on the understanding of diverse life phenomena using an integrated approach of biology and chemistry. Biomedical Engineering is dedicated to the development of advanced tools and knowledges that can be applied for medical treatments and early diagnosis in clinics. Neuroscience investigates unknown mechanisms underlying human cognition and brain disorders to find new treatment drug and technology. Bio-Medical convergence major provides top class atmosphere and opportunity for cutting edge researches in biomedical science and technology.

Concentration

Biomedical engineering

is a multi-disciplinary program of engineering, biology, and medical science. Biomedical engineering develops new medical techniques which can solve an incurable diseases and disabilities by combining engineering technology with biological science. BME is dedicated to the development of advanced knowledge and tools that can be applied for medical treatments and early diagnosis in clinics.



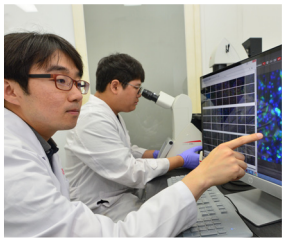


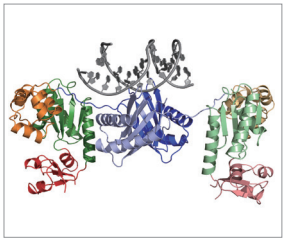
❶ **Biomaterials, tissue engineering, molecular imaging**
Biodegradable metal, Hydrogels, Tissue engineering, Nanomaterials, Molecular imaging, Cancer diagnosis, Smart drug delivery

❷ **Biomicrosystems**
Microfluidics, Neural probe, Brain on a chip, Biosensor

Biological chemistry

focuses on understanding diverse life phenomena and application on researches for treatment and diagnosis of various diseases based on integrated approach of biology and chemistry.





❶ Study of mechanism on cancer, brain & cardiovascular disease, inflammatiory disease

- Development of biomarkers for early diagnosis or prognosis
- Discovery of drug action point and validation

❷ Discovery of new drug candidates

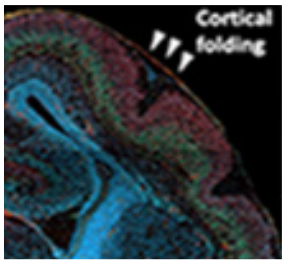
- Artificial intelligence-based drug design
- Synthesis of new drug candidates through organic synthesis
- Immunotherapy study on anti-cancer using bio/nano materials
- Development of functional substances and new drug candidates using natural products

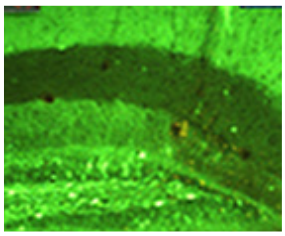
❸ Application of biological chemistry to health promotion and disease treatment

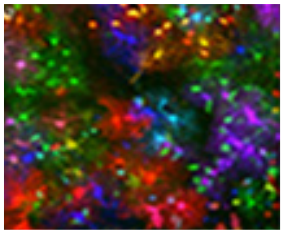
- Development of biosensors and therapeutic drugs
- New methods development for bio/environmental samples and risk assessment for human health

Neuroscience

is committed to the prevention and treatment of brain disorders throught the systematic understanding of brain functions and related behaviors. The multidisciplinary research approaches are adopted at each level of study of genes and protein, neuronal cells and glia, neuronal circuits, and animal behavior.







❶ Study of brain function and disorders

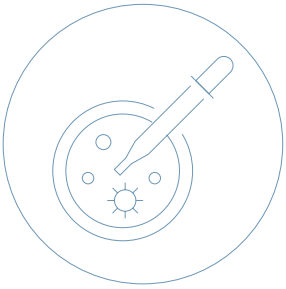
- Development of markers for cellular activity & monitoring of cell population activity and developing new theoretical tools for data analysis
- Discovery & modulation of new neuronal circuits for brain function via neuronal connect omics, optogenetics, and pharmacogenetics
- Studies on sensory system in peripheral and CNS
- Understanding the interactive mechanisms of metabolism and neuroinflammation within brain
- Research on synaptic and cellular functions in animal models of cognitive, neurodegenerative, and neurodevelopmental disorders
- Computational approaches to understanding of cellular and molecular processes in normal and disease models as well as neuronal circuit interactions for translational research for Artificial Brain Computer chip development

❷ Discovery of neurodegenerative disease therapy

- Development of new therapeutic drugs for neurodegenerative and neurodevelpmental diseases such as autism, Huntington's disease, traumatic brain injury, and etc.
- Development of new cell therapy to brain disorders such as addiction

Research Results

- Subcircuits of deep and superficial CA1 place cells support efficient spatial coding across heterogeneous environments (Neuron, 2021)
- Fine-tunable and injectable 3D hydrogel for on-demand stem cell niche (Advanced Science, 2019)
- Xenogenization of tumor cells by fusogenic exosomes in tumor microenvironment ignites and propagates antitumor immunity (Science Advances, 2020)



Division of Energy & Environment Technology

The renewable energy and the clean environment are urgent challenges the whole world is facing. The sustainable world can be achieved by an integrated strategy combining energy and environment technology because both are dependent to each other. The Energy and Environment Technology studies the integrated research of energy engineering and environment engineering to investigate the advanced academic and industrial issues in the fields of energy and environment. The energy engineering major encourages the students to study the processes of generating, storing, and utilizing energy based on the scientific principles. The environment engineering major encourages the students to study atmosphere, water, environmental sensors, and toxicology for chemical, physical, and biological bases. For both majors, basic knowledge of chemistry, physics, biology, materials science, chemical engineering, civil engineering, electric engineering, and other decent scientific subjects will be studied during the training at the KIST school. We always want our students to be outstanding scientists and engineers with the expert knowledge and practical skills for pioneering the advanced technology of energy and environment.

Concentration

Energy Engineering

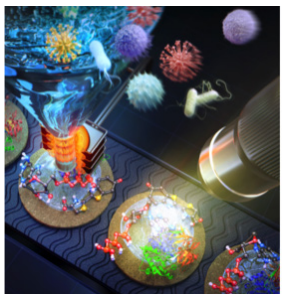
We provide the fundamental grounds of research based on the industrial feasibility for clean and sustainable energy.

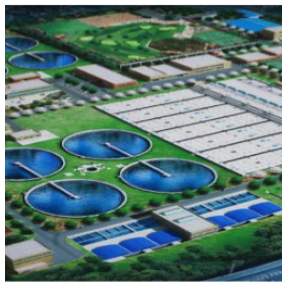
- Electrochemical/biochemical conversion of carbon (CO_2) to fuels/chemicals
- Chemical/biochemical conversion of biomass/plastics to fuels/chemicals
- Organic/organic-inorganic hybrid solar cells and energy materials
- Hydrogen fuel cells- Energy storage systems

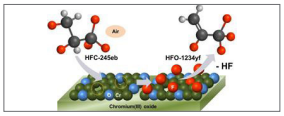
Environment engineering

We provide the basic science and applied research for understanding and resolving the global environmental issues including climate change, air pollution, microplastics, and waster scarcity.

- Advanced Oxidation Process for water treatment
- Biotechnology for water treatment
- Membrane technology for water treatment
- Subsurface environment management technology|
- Atmopspheric and climate science, and particulate matter research
- Atmospheric chemistry
- Environmental hazardous pollutants diagnostics and sensing
- Catalysts for control of environmental hazardous pollutants
- Environmental safety assessment

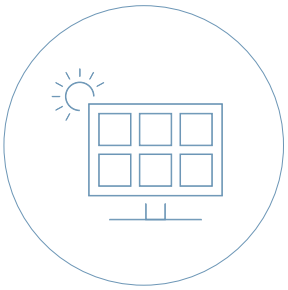






Research Results

- Highly efficient oxygen evolution reaction via facile bubble transport realized by three-dimensionally stack-printed catalysts (Nature Communications, 2020)
- Hydrophilic photocatalytic membrane via grafting conjugated polyelectrolyte for visible-light-driven biofouling control (Applied Catalysis B: Environmental, 2021)
- Characterization of severe spring haze episodes and influences of long-range transport in the Seoul metropolitan area in March 2019 (Atmospheric Chemistry and Physics, 2020)



Division of Nano & Information Technology

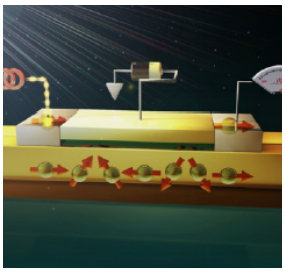
Nano-Information convergence major includes both of Nanomaterials Science and Engineering program and HCI & Robotics program. Nanotechnology has been developed recently and applied for many different fields such as materials science, mechanics, bio-and information technology. In Nanomaterials Science and Engineering program, we introduce the nanotechnology and related application with information technology. In our HCI & Robotics program, we introduce the basic technologies in the Human Computer Interaction (HCI), mechatronic and computer science areas, covering all aspects of HCI and robotics applications, including the industrial, service, medical, and extreme environment sectors. We aim at providing students with higher education and chances to obtain practical experience by participating in many projects in Nano and Information technology field.

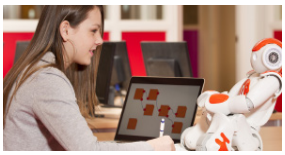
Concentration

Nanomaterials Science & Technology

Provides 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 for nanomaterials and to successfully explore diverse solutions based on understanding of nonlinear, unusual, or new properties of materials with respect to their nano-scale structures.

- forming and characterizing various nano-structured materials such as nano polymers, quantum dots, nano wires, nano films and nano particles, and for analyzing all attendant structure-property relations.
- basic research pursuing fundamental understanding of the properties of nanostructure materials, advanced research in developing stand-alone NT technologies or fusion technologies with IT (information processing, storage, display, sensing, etc.), ET (energy conversion, storage, environmental technology) or BT (bio technology).





HCI & Robotics

Introduce the basic technologies in Human Computer Interaction,mechatronic and computer science areas, and covers all aspects of HCI and robotic applications like industrial, service, medical and extremal environments

- Human Computer Interaction
  - Artificial intelligence / Computer vision
  - Modeling / VR,AR
  - Internet / Multimodal interaction
- Robotics
  - Robot design / Perception and control
  - Knowledge representation and inference / Task planning
  - Multi-robot collaboration / Human-Robot Interaction

Research Results

- Graphene Self-Phase-Lockers Formed around a Cu Wire Hub for Ring Resonators Incorporated into 57.8 Gigahertz Fiber Pulsed Lasers (ACS Nano, 2020)
- Label-free brain tissue imaging using large-area terahertz metamaterials (Biosensors and Bioelectronics, 2020)
- Multiple Classification of Gait Using Time-Frequency Representations and Deep Convolutional Neural Networks (IEEE transactions on neural systems and rehabilitation engineering, 2020)

KIRI LAB

KIRI LAB Service

KIRI LAB

In-house expert

- Time: Mon/Wed/Fri 13:00~ 18:00
- Offer: Education of equipment usage and its principle, electric circuit analysis and Micro-computer experiment support, equipment fix support

Periodical Equipment usage education

- Content: 3D modeling & Equipment usage
  - Once in a period(Scheduled), the detail will be on the KIRI LAB homepage

Operate UST Major Course using KIRI Lab equipment

- Basic laboratory electronic for lab automation. Designed for non-EE based student.

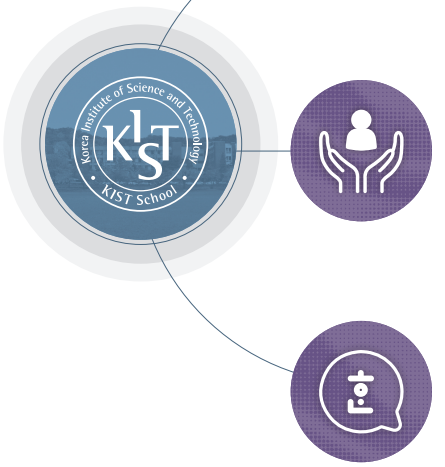
FAB LAB

KIRI LAB is a Fab Lab space where students can make the idea they design by themselves
Fab Lab is abbreviation of 'Fabrication Laboratory', is a small–scale workshop offering (personal) digital fabrication.

Tapping machine | Drilling machine | Laser engraving Machine | Iron | Belt sander | Angle grinder | Jigsaw | Cordless drill

Classification	Equipment
3D Printing & IoT Equipment	3D Printer, 3D scanner, Arduino kit, Oscilloscope, Raspberry Pi kit, PC & Dual monitor
Electronic Device	Oscilloscope, Function generator, DC power supply, Multimeter
Workshop equipment	CNC Milling Machine, Laser engraving Machine, Tapping machine, Drilling machine, Jigsaw, Angle grinder, Iron, Smoke generator, Belt sander, Cordless drill tool set
Filming equipment & editing equipment	Action camera, Gimbal, DSLR Camera & editing program/software Action camera, Gimbal, DSLR Camera & editing program/software
Lesson & meeting equipment	Projecter&Screen, Meeting table, tool set

Student Benefits



❶ Full Scholarship

- Tuition and registration costs are covered by KIST.
- The highest level of financial support in Korea is provided to help students focus on their study and research.
- Amount for a Ph.D student _ a minimum of USD 1,500 per month
- Amount for a Master student _ a minimum of USD 1,000 per month
- Amount for an bachelor student _ a minimum of USD 900 per month

❷ Student Welfare

- Diverse academic / cultural events
- Free dinners for researchers working overtime
- Discounted condominium rates at many major tourist destinations in Korea
- First-rate dormitory facilities for 120 USD per month
- Comprehensive insurance

❸ Korean Languange Class

- Support for learning Korean language
- Various on-line and off-line classes are provided for student's adjustment in Korea and for academic life

Alumni Benefits

KIST has provided the KIST School alumni with the opportunity to participate in the KIST School Partnership Project in order to stay connected, to maintain continuous and close relationship with KIST, and to support their research activities. The selected alumni may request a budget of up to 14,000 USD for a project.

Eligibility

- Should be KIST School alumni members, who are incumbent university faculty members or national/public institute researchers

Period

- Begins from September, the funding term should be 12 months.

Accomplishments

Graduates

- 613 (September, 2020)
- 31 different countries

Nationality	The Number of Students	Nationality	The Number of Students
Bangladesh	32	Malaysia	3
Cambodia	1	Mongolia	5
Canada	2	Myanmar	1
China	19	Nepal	8
Costa Rica	3	Nigeria	4
Egypt	14	Pakistan	29
East Timor	2	Philippine	3
Ethiopia	2	Russia	2
France	2	Rwanda	1
Germany	1	Thailand	5
India	38	Ukraine	16
Indonesia	81	USA	5
Iran	4	Vietnam	76
Israel	1	Tunisia	1
Lithuania	1	Turkey	1
Korea	250		

Research Performance

©Science

Dr. Aamir Iqbal

- Enrolled Integrated course student
- Science (2020) 41.846/2.113% [IF/JCR]

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Anomalous absorption of electromagnetic waves by 2D transition metal carbonitride Ti3CNTx (MXene)

Vol. 369, Issue 6502, 24 Jul, 2020

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©Science

Dr. Shahzad Faisal

- '17 Ph.D. graduate (Pakistan)
- Science(2016) 34.661/3.17%[IF/JCR]

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Electromagnetic interference shielding with 2D transition metal carbides (MXenes)

Science, Vol 353, Issue 6304, 09 September 2016

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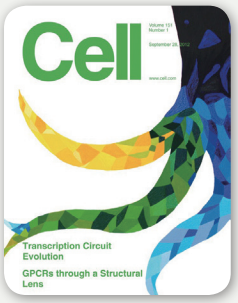

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TREK-1 and Best1 channels mediate fast and slow glutamate release in astrocytes upon GPCR activation

Cell 151, 25–40, 28 September 2012

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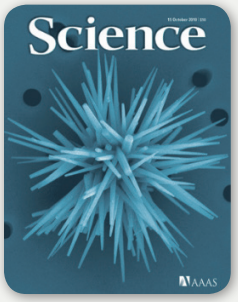

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Channel-Mediated Tonic GABA Release from Glia

Science, Vol. 330, Issue. 6005, 15 October 2010

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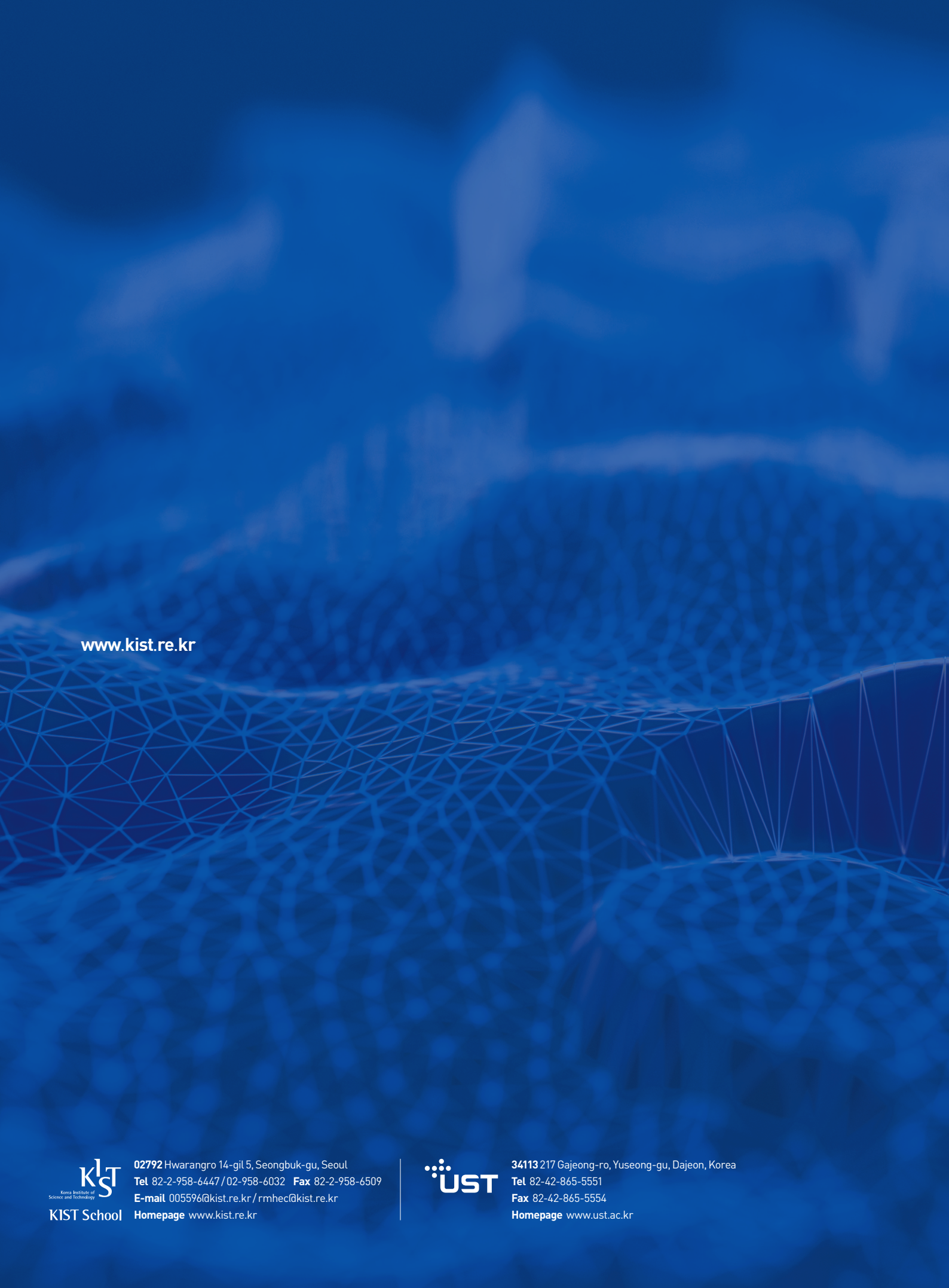

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