2020 Spring Semester Admission Guide for International Graduate Students (Industrial Technology Advance)

ITA majors

- Artificial Intelligence
- Biomedical Convergence Science & Technology
- Hydrogen & Renewable Energy
- Robot and Smart System Engineering
ABOUT KYUNGPOOK NATIONAL UNIVERSITY

History
1. 1946. 5. College of Education, Medicine and Agriculture in Daegu were upgraded to National Colleges
2. 1951. 10. College of Education, Medicine and Agriculture, Liberal Arts and Sciences, Law and Political Sciences were combined to create Kyungpook National University
3. 1953. 5. First graduate school was established
4. 2019. Kyungpook National University is comprised of 17 colleges, 68 majors, 11 graduate schools and 124 research Centers

Numbers
1. 4 Campuses (3 in Daegu, 1 in Sangju)
2. 37,322 students in total, 30,719 undergraduate students, 6,603 graduate students, 1,821 international students
3. 1,180 full-time faculty members, 1,194 administrative staffs, 235,003 graduates cumulative
In order to foster creative convergence talent and our university's representative research brand to lead the 4th Industrial Revolution era, ITA Convergence Graduate School is established in September 2019. Four majors are established with Artificial Intelligence, Biomedical Convergence Science & Technology, Robot and Smart System Engineering, Hydrogen & Renewable Energy to train core personnel of the 4th Industrial Revolution.
Introduction of ITA Departments

**Department of Artificial Intelligence**

It aims to secure world's top technological competitiveness in AI field, a key source technology that leads the fourth industrial revolution, and foster talented people who will lead AI-based innovation.

**Department of Biomedical Convergence Science & Technology**

It aims to foster convergence research personnel and professional leaders who can understand the academic disciplines necessary for diagnosing/preventing/treatment of diseases and develop new medical biotechnology technologies through creative convergence research covering various fields such as natural science, engineering, medicine, and pharmacology.

**Department of Hydrogen & Renewable Energy**

By maximizing synergy effect through fusion and composite research with new and renewable energy technologies, which emerge as core technologies in the 4th Industrial Revolution era, the government aims to foster creative convergence talent that is a key leader in science, technology and industry of the 4th Industrial Revolution.

**Department of Robot and Smart System Engineering**

Aiming to grow into a hardware-oriented leading robot research group, it aims to become one of the nation's best robot education and research institutes in name and reality to compete with global robot research groups by conducting convergence education and convergence research in various fields, including AI, medical, construction and manufacturing.
Department of Artificial Intelligence
The Department of AI

**Vision**

*Medical, brain science/cognition, electronic computers, and automotive + AI*

**AI-based Technology Innovation**
- AI+ Next Generation AI Models
- AI+ X Applications

**Development of Advanced AI Engineers**
- Advanced AI Engineers
- Application AI Engineers
- ICT Convergence AI Engineers

**Technology and Innovation Foundations**
- Open SW, Open API
- Research-oriented AI Brain Lab
- Open Research Environment
Programs

Advanced AI

Fundamentals of AI, Intensive major courses, Interdisciplinary joint education

Expert AI

Intensive education and research programs for specialized fields

Medical  Vehicles  Electronics, Computers  Brain Science, Cognition

1. Joint Subjects between AI Convergence
2. AI Convergence Courses
3. Mandatory internships at home and abroad (Expert-level)
4. Cooperative research programs between subjects
5. AI convergence research programs
Flexibility in Education

Flexible student selection and AI education through certification system for credits from other departments

Flexible operation of credit certification system for AI-related education completion
→ Students in 3rd or 4th grade can participate in 2+2 curriculum

Active promotion of common completion of AI and other subjects

Open Classroom / Laboratory

- We highly promote credit exchanges among other subjects
  → Opening various AI courses targeting for students in other departments
- Encouraging students in the AI department to take courses in other departments

Flexibility in department management

- Modular Curriculum
- Internship Credit System
- Online and Flipped Learning Classes
- Convergence Major and Major Selection
- Intensive Course
- Flexible Credit System
# Faculty Research Areas

<table>
<thead>
<tr>
<th>Professor</th>
<th>Research Areas</th>
<th>E-Mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minho Lee</td>
<td>Deep Learning, Neural Networks, Brain Informatics</td>
<td><a href="mailto:mholee@gmail.com">mholee@gmail.com</a></td>
</tr>
<tr>
<td>Dong Seog Han</td>
<td>Machine Learning Applications, Intelligent Vehicles</td>
<td><a href="mailto:dshan@knu.ac.kr">dshan@knu.ac.kr</a></td>
</tr>
<tr>
<td>Min Young Kim</td>
<td>Robotic Visual Intelligence, Embedded System and Control</td>
<td><a href="mailto:minykim@knu.ac.kr">minykim@knu.ac.kr</a></td>
</tr>
<tr>
<td>Gil-Jin Jang</td>
<td>Machine Learning, Speech Processing</td>
<td><a href="mailto:gjang@knu.ac.kr">gjang@knu.ac.kr</a></td>
</tr>
<tr>
<td>Mallipeddi Rammohan</td>
<td>Evolutionary Computations, Intelligent Systems</td>
<td><a href="mailto:mallipeddi@knu.ac.kr">mallipeddi@knu.ac.kr</a></td>
</tr>
<tr>
<td>Hyeyoung Park</td>
<td>Brain Computing, Machine Intelligence</td>
<td><a href="mailto:hypark@knu.ac.kr">hypark@knu.ac.kr</a></td>
</tr>
<tr>
<td>Jaeil Kim</td>
<td>Machine Learning, Medical Image Processing</td>
<td><a href="mailto:jaeilkim@knu.ac.kr">jaeilkim@knu.ac.kr</a></td>
</tr>
<tr>
<td>Seokin Hong</td>
<td>Computer Architecture and Systems</td>
<td><a href="mailto:seokin@knu.ac.kr">seokin@knu.ac.kr</a></td>
</tr>
<tr>
<td>Young-Tae Kim</td>
<td>Neuromorphic Computing, VLSI CAD</td>
<td><a href="mailto:yongtae@knu.ac.kr">yongtae@knu.ac.kr</a></td>
</tr>
<tr>
<td>Chobok Kim</td>
<td>Cognitive Neuroscience, Cognitive Psychology</td>
<td><a href="mailto:ckim@knu.ac.kr">ckim@knu.ac.kr</a></td>
</tr>
<tr>
<td>Yong Rim Kim</td>
<td>Renal Medicine</td>
<td><a href="mailto:ylkim@knu.ac.kr">ylkim@knu.ac.kr</a></td>
</tr>
<tr>
<td>Jae Chan Park</td>
<td>Cerebrovascular disease</td>
<td><a href="mailto:jparkneurosurgery@gmail.com">jparkneurosurgery@gmail.com</a></td>
</tr>
<tr>
<td>Kyung Ho Seok</td>
<td>Neuroimmune Pharmacology</td>
<td><a href="mailto:ksuk@knu.ac.kr">ksuk@knu.ac.kr</a></td>
</tr>
<tr>
<td>Young Ran Yoon</td>
<td>Clinical pharmacology</td>
<td><a href="mailto:yry@knu.ac.kr">yry@knu.ac.kr</a></td>
</tr>
<tr>
<td>Jae-Mo Kang</td>
<td>Deep Learning, Information Security, Blockchain Networks</td>
<td><a href="mailto:jmkang@knu.ac.kr">jmkang@knu.ac.kr</a></td>
</tr>
<tr>
<td>Heechul Jung</td>
<td>Deep Learning, Computer Vision</td>
<td><a href="mailto:heechul@knu.ac.kr">heechul@knu.ac.kr</a></td>
</tr>
<tr>
<td>Hoyoung Jung</td>
<td>NLP, Speech and Language Information Processing</td>
<td><a href="mailto:hoyjung@knu.ac.kr">hoyjung@knu.ac.kr</a></td>
</tr>
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</table>
Biomedical Convergence Science & Technology
Biomedical Convergence Science & Technology @ Industrial Technology Advance

Development of convergence researcher and professional leaders who can understand the academic needs for diagnosis/prevention/treatment of diseases and develop new medical biotechnology through creative convergence research spanning various fields such as science, engineering, medicine and pharmacology.

The challenge of mankind
- An incurable disease
- Climate change

Social change
- Low birth rate
- 4th Industrial revolution
- Aging

BST

New Paradigm
- Sustainable transformation
- Convergence research innovation
- Creating shared value

Social Impact
- Convergence global leader
- Early diagnosis/Treatment technology
- Economic revitalization/Employment
- Rehabilitation of convergence knowledge
Prof. Moon-Chang Baek (Chair)
- Protein biochemistry/molecular biology, Diagnosis & treatment based on exosome
- e-mail: mcbaek@knu.ac.kr

Prof. Seong Ho Kong
- Intelligent MEMS sensors
- MEMS devices fabrication
- e-mail: shkong@knu.ac.kr

Prof. Moon Kyu Kwak
- Micro/nano fabrication & applications
- Biomimetics
- e-mail: mlkwak@knu.ac.kr

Prof. Kyung-Jin Kim
- Structural molecular biology
- e-mail: kkim@knu.ac.kr

Prof. Gyu Man Kim
- Nano/micro systems
- e-mail: gyuman.kim@knu.ac.kr

Prof. Sung-Wook Nam
- Nano-bio devices
- Nanomaterials & Nanofabrications
- e-mail: namw@knu.ac.kr

Prof. Younghae Do
- Nonlinear Dynamics
- Mathematics science in Medical
- e-mail: yhdo@knu.ac.kr

Prof. Kyoung-Ik Min
- Microfluidics, Microchemical process
- Self assembly of peptides
- e-mail: minwing8055@knu.ac.kr

Prof. Jonghoo Park
- NEMS/MEMS sensor
- Electro optical sensor
- e-mail: jonghoopark@knu.ac.kr

Prof. Hongsik Park
- Integrated CMOS/Si-photonic chips
- Multifunctional integrated smart sensor technology
- e-mail: hpark@ee.knu.ac.kr

Prof. Jae-Sung Bae
- Physiology/neurology
- Alzheimer’s disease technique & treatment
- e-mail: jsbae@knu.ac.kr

Prof. Jae-Ho Shin
- Molecular microbiology, bioinformatics
- Next Generation Sequencing & Omics
- e-mail: jhshin@knu.ac.kr

Prof. Byung-Heon Lee
- Molecular imaging and targeted drug delivery using phage display-identified peptides
- e-mail: leebh@knu.ac.kr

Prof. Sang-Han Lee
- Enzymes in Food Biotechnology
- e-mail: sang@knu.ac.kr

Prof. In-Kyu Lee
- Diabetes/Diabetic complications
- Vascular proliferative disease
- e-mail: leei@knu.ac.kr
Faculty

Prof. Jae Man Lee
- Endocrine biochemistry
- Metabolic diseases
- e-mail: jaemanlee@knu.ac.kr

Prof. Jeong Ho Chang
- Molecular biology
- Protein structure & function analysis
- e-mail: jhcbio@knu.ac.kr

Prof. Young Hun Jeong
- Biomaterials and tissue engineering
- 3D printing and bioapplications
- Precision machining
- e-mail: yhjeong@knu.ac.kr

Prof. Jun-Goo Jee
- Physical Biochemistry & Pharmacy
- e-mail: jjee@knu.ac.kr

Prof. Je-Yong Choi
- Bone constancy
- e-mail: jechoi@knu.ac.kr

Prof. Young Ki Hahn
- Microfluidics, BioMEMS
- Biosensors for disease diagnosis
- e-mail: hahnv@knu.ac.kr

Prof. Keun Hur
- Cancer translational research
- e-mail: KeunHur@knu.ac.kr

Prof. Ui-wook Hwang
- Mitome, Chlome
- Endangered Species
- Marine invertebrates
- e-mail: uwhwang@knu.ac.kr
Objectives & visions in BCST department

- **Education**: Training of glocal (global+local) leaders with hybrid knowledge in biomedical field
  - Convergence education → Glocal leaders

- **Research**: Development of early diagnosis/treatment of incurable and degenerative diseases through convergence technology
  - BINT convergence technology → Early diagnosis/treatment of diseases

- **Industrial-Academic Cooperation**: Excavation of stronghold enterprises & improvement of human/material pre-circulation structure
  - Industrial-Academic Cooperation → Economic vitalization / Job creation

- **Service**: Rehabilitation of knowledge of convergence complex technology for well-being/silver society
Directions & specialized programs

Convergence & Translational research

- Translational research based on the technologies developed in the laboratory
- Implementation by the commercialization & collaboration with the hospital

Specialized degree program

- Training human resources who create new problems, methods and results in the convergence research
- Creating a new field of convergence through interdisciplinary research in science, engineering, medicine, and medicine

Expected career paths after graduation

- Academic, research institute related to biomedical field (government-funded and corporate), hospital, pharmaceutical company, biotechnology company, post-doctoral researcher (leading universities abroad), etc
- A variety of careers as experts who can commercialize bio-convergence technologies
Development of fundamental convergence technology for the early diagnosis and treatment based on extracellular vesicles

Microenvironment/ Circulation

- **Avartar EV**
  - Biomarkers (Protein, miRNA)
  - Size, density of EVs (Nanopore/microfluidic chips)

- **Malicious EV**
  - EV mechanism for secretion control
  - EV functions

- **Carrier EV**
  - Drug Delivery System (DDS)

**Key research fields**

- **Liquid biopsy**
- **Pattern recognition-based diagnostics**
- **Mechanism for secretion control and functions**
- **Therapy**

Disease cells to Normal cells secretion
Key research fields

1) Functional 3D structure/support
   • Fabrication of a porous polymer structure using micro template
   • Fabrication of the integral vascular mimicked structures

2) Porous membrane
   • Fabrication technology of PDMS film for nano porous fiber
   • Nanofiber thin film fabrication technology for mimicking functional thin film with multiple tissue layers

3) Nano/micro chip
   • Fabrication of chips with nano/microfluidic channels
   • Nano/micro-structure formation technology for multi-dimensional scaffold functionality

Generation of in vitro cell/tissue culture environment for EV isolation/extraction

In vitro test environment alternative to animal testing for disease diagnosis and drug evaluation
Department of Hydrogen & Renewable Energy
I Hydrogen & Renewable Energy
II Programs
III Faculty Research Area
IV Financial Aid
I. Department of Hydrogen and Renewable Energy

Multidisciplinary Convergence Group Study

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<tbody>
<tr>
<td>• Physics</td>
<td>• Applied Chemical Eng.</td>
<td>• Advanced Materials Eng.</td>
</tr>
<tr>
<td>• Chemistry</td>
<td>• Advanced Materials Eng.</td>
<td>• IT Electrical Eng.</td>
</tr>
<tr>
<td>• Biology</td>
<td>• Energy Eng.</td>
<td>• Architecture Eng.</td>
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Information Sharing Platform

Renewable Energy

Various Networks between Professors
Cooperation / Convergence Research by Sharing Research Equipment

Convergence Research / Synergy

Future Renewable Energy Science & Technology
Maximize synergy of convergence research capability
II. Programs

☐ Department Program

- Energy Production
  - Solar
  - Bio-Energy
  - Hydrogen Production
  - Energy Harvesting

- Energy Storage
  - Battery
  - Hydrogen Storage
  - Bio-Energy Conversion
  - ESS (Energy Storage Syst.)

- Energy Application
  - Fuel Cell
  - DC-AC Conversion
  - ESS Operation

☐ Double Degree Program

- Two Master’s degrees from KNU and Nantes, France in two years
- Up to 5 students will be selected each year
- International collaboration with leading universities in France

☐ New Zealand Wintech University & Institute Internship

- Overseas research internship and language program
- 19 persons were selected and dispatched in the last 3 years
### III. Faculty Research Areas

#### Professors, Major, Contacts

<table>
<thead>
<tr>
<th>Professor</th>
<th>Major</th>
<th>Telephone</th>
<th>e-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ho Sung Yoon (Dean)</td>
<td>Plant Molecular Physiology</td>
<td>053-950-5348</td>
<td><a href="mailto:hsy@knu.ac.kr">hsy@knu.ac.kr</a></td>
</tr>
<tr>
<td>Junyeob Yeo</td>
<td>Nano Optical Experiment</td>
<td>053-950-7360</td>
<td><a href="mailto:junyeob@knu.ac.kr">junyeob@knu.ac.kr</a></td>
</tr>
<tr>
<td>Sang-II Choi</td>
<td>Nanochemistry/Electrochemistry</td>
<td>053-950-7369</td>
<td><a href="mailto:sichoi@knu.ac.kr">sichoi@knu.ac.kr</a></td>
</tr>
<tr>
<td>Sekyung Han</td>
<td>Power System</td>
<td>053-950-7230</td>
<td><a href="mailto:skhan@knu.ac.kr">skhan@knu.ac.kr</a></td>
</tr>
<tr>
<td>Joon-Hyung Lee</td>
<td>Electronic Ceramic Property Research</td>
<td>053-950-7512</td>
<td><a href="mailto:joonlee@knu.ac.kr">joonlee@knu.ac.kr</a></td>
</tr>
<tr>
<td>Yeon Uk Jeong</td>
<td>Energy and Functional Materials Research</td>
<td>053-950-7586</td>
<td><a href="mailto:jeong@knu.ac.kr">jeong@knu.ac.kr</a></td>
</tr>
<tr>
<td>Young-woo Heo</td>
<td>Electronic Materials / Elements</td>
<td>053-950-7587</td>
<td><a href="mailto:ywheo@knu.ac.kr">ywheo@knu.ac.kr</a></td>
</tr>
<tr>
<td>Sangwook Lee</td>
<td>Nano / Energy</td>
<td>053-950-5632</td>
<td><a href="mailto:wook2@knu.ac.kr">wook2@knu.ac.kr</a></td>
</tr>
<tr>
<td>Ho Seong Lee</td>
<td>Thermoelectronic Materials / Electron Microscopy</td>
<td>053-950-7583</td>
<td><a href="mailto:hs.lee@knu.ac.kr">hs.lee@knu.ac.kr</a></td>
</tr>
<tr>
<td>Sang-Eun Chun</td>
<td>Electrochemical / Electrochemical Energy Storage Laboratory</td>
<td>053-950-5566</td>
<td><a href="mailto:sangeun@knu.ac.kr">sangeun@knu.ac.kr</a></td>
</tr>
<tr>
<td>Sungjin Jo</td>
<td>Solar cell</td>
<td>053-950-8971</td>
<td><a href="mailto:sungjin@knu.ac.kr">sungjin@knu.ac.kr</a></td>
</tr>
<tr>
<td>In Woo Cheong</td>
<td>Nano Materials Chemistry</td>
<td>053-950-7590</td>
<td><a href="mailto:inwoo@knu.ac.kr">inwoo@knu.ac.kr</a></td>
</tr>
<tr>
<td>Jin Joo</td>
<td>Inorganic Nano Materials</td>
<td>053-950-5585</td>
<td><a href="mailto:joojin@knu.ac.kr">joojin@knu.ac.kr</a></td>
</tr>
<tr>
<td>Kyuchul Shin</td>
<td>Energy system</td>
<td>053-950-5587</td>
<td><a href="mailto:kyuchul.shin@knu.ac.kr">kyuchul.shin@knu.ac.kr</a></td>
</tr>
<tr>
<td>Young Kyoo Kim</td>
<td>Organic Nano Electronics</td>
<td>053-950-5616</td>
<td><a href="mailto:ykimm@knu.ac.kr">ykimm@knu.ac.kr</a></td>
</tr>
<tr>
<td>Soo Hwan Jeong</td>
<td>Nano Materials</td>
<td>053-950-7597</td>
<td><a href="mailto:shjeong@knu.ac.kr">shjeong@knu.ac.kr</a></td>
</tr>
<tr>
<td>Won-Hwa Hong</td>
<td>Urban environment and equipment</td>
<td>053-950-7010</td>
<td><a href="mailto:hongwh@knu.ac.kr">hongwh@knu.ac.kr</a></td>
</tr>
<tr>
<td>Jong-wook roh</td>
<td>Nano Materials and Devices</td>
<td>054-530-1414</td>
<td><a href="mailto:jw.roh@knu.ac.kr">jw.roh@knu.ac.kr</a></td>
</tr>
<tr>
<td>Byoung-Seong Jeong</td>
<td>Semiconductor and Display Devices / Materials</td>
<td>053-950-2336</td>
<td><a href="mailto:gatorever@knu.ac.kr">gatorever@knu.ac.kr</a></td>
</tr>
</tbody>
</table>
IV. Financial Aid

☐ Research / Teaching Assistantships

☐ Students who have outstanding research achievements are sent to foreign universities for one semester to support overseas joint research
Department of Robot and Smart System Engineering
Robotic technology, the core of the 4th Industrial revolution era

• Robot is the core technology of the fourth industrial revolution.
• Robot is one of the 17 new growth engines of Korea and of the 8 Daegu/Gyeongbuk future industries.
• Needs for robot-related technologies and applications continue to increase.

Development of robust & creative Human resource

• Among THE top 20 Asian universities, 2 undergraduate (Hanyang & Yeungnam Univ.) & 4 graduate schools of robotics (Gyeongbuk National University, KAIST, Korea & Sungkyunkwan Univ.)
• First undergraduate & graduate schools of Robotics in Korea, Kyungpook National University
• The interest in robots of young students is rapidly increasing

One-stop Warehouse for Robot convergence research

• The robotics design, fabrication and application require multidisciplinary convergence research groups.
• KAIST Hubo is the only Korean university research-brand with hardware robots.
• One-Stop Warehouse Convergence Robot Research Group is needed for leading Korean hardware-based robot technology.
One-Stop Warehouse for HW-aimed convergence research

**Participating faculty**

**Mechanical Engineering (8)**
- Sang Ryong Lee, Namchel Kang, Bo Yeong Kang, Yong Rae Roh, Ho Lee, Clare C. Byeon, Yong Joong Lee, Chang Soon Hwang

**Electronics Engineering (4)**
- Hyun-Deok Kim, Soon-Yong Park, Yun-Jung Lee, Sang-Moon Lee

**Electrical Engineering (1)**
- Joonwoo Lee

**Architecture (1)**
- Dong-Eun Lee

**Robot & Smart System Engineering (1)**
- Jung-wook Suh

**External participants (2)**
- Kwon Oh-Won (KIMM)
- Choi Hongsoo (DGIST)

**Robot Structure and Dynamics**
- Namchel Kang (ME: dynamics/vibration)
- Yong Rae Roh (ME: Sensor)
- Sang-Moon Lee (EE: robot control)

**Control**
- Sang-Moon Lee (EE: robot control)

**Design Lab**

**Building Fab**
- Sang Ryong Lee (ME: robot design/control)
- Bo Yeong Kang (ME: AI)
- Jung-wook Suh (ROSE: robot mechanism)
- Soon-Yong Park (EE: Vision)
- Yun-Jung Lee (EE: robot control)

**Field App**
- **Medical robot**
  - Oh-Won Kwon (KIMM: medical machine)
  - Hongsoo Choi (DGIST: bio/nano robot)
- **Construction robot**
  - Dong-Eun Lee (Architecture: automation)
- **Production robot**
  - Hyun-Deok Kim (EE:Advanced manufacturing)
  - Ho Lee (ME: laser technology)
IT Robot Education Future Direction

Development of Robot-Convergence Talent to Lead the Hardware-oriented

- **Visio n**
  - Globally-oriented, Knowledge-driven university
  - Robot-convergence talent to lead the 21st century robot

- **Student**
  - Global creative talent
  - Self-motivated/converged/practical future robotics talent

- **Personality**
  - Self-motivated exploration
  - Creative Communication
  - Advanced pursuit of truth
  - Self-motivated consilience
  - Practical convergence
  - State-of-the-art engineering

**Promotion plan for Dept. of Robot & Smart System Engineering**

- Mid-/long-term development plan for university

- Convergence major
  - Intelligent robot
  - Medical robot
  - Medical robot

- Core major
  - Electronic engineering
  - Medical robot
  - Mechanical engineering

- Basic engineering
  - Basic mathematics
  - Basic engineering

- Self-directed type (Pride) liberal arts
  - Self-directed type (Truth) liberal arts
  - Self-directed type (Service) liberal arts

- Core major
  - Architecture
  - Computer science

- Basic science
  - Basic programming

- Convergence major
  - Construction automation
  - Artificial intelligence

[Lucid Pole model of the department curriculum]
Increase the market competitiveness of university and students & Contribute to improving the performance of companies and organizations

Graduate Inter-disciplinary Program of Robot Engineering (2009~)
- Master’s and Ph.D courses
- HW-oriented education
- Advanced Infrastructure

Department of Robot & Smart System Engineering (2019~)
- Flexible course
- HW education
- Substantial convergence
- Convergence course
- Double major (50 credits)
- Convergent major (30 credits)
- Bachelor’s-Master’s Course
- One Man One Robot
- Graduation exhibition
- Field-oriented education
- Major in robotics
- Curriculum sharing
- Undergraduate research
- Team teaching
- Flipped learning
- New curriculum

Demand for change in government and society
- Enhancement of undergraduate education
- Advancement of higher education
- Daegu city
- Development of talent that corporations require
- Development & Spread of undergraduate education model
- Alleviation of youth unemployment
- On-the-spot training
- KIMM, DGIST, IACT
- Establishment of a cooperative system for higher education
- IIT, UCLA, etc.

Corporations
- Selection & concentration
- Established virtuous cycle
- Enhanced execution
- Reinforce educational competitiveness
- Strengthen research competitiveness
- Build an optimal education/research system

Universities
- Specialize
- Development of HEART Human
- Advanced university operating system
- Promote change in government and society
- Specialize
- Graduation Inter-disciplinary Program of Robot Engineering (2009~)
- Graduation exhibition
- Field-oriented education
- New curriculum

Research Institutes
- IACT, KIMM, DGIST
- Development & Spread of undergraduate education model
- Alleviation of youth unemployment
- On-the-spot training
- KIMM, DGIST, IACT
- Establishment of a cooperative system for higher education
- IIT, UCLA, etc.

International cooperation
- Promotion of KNU VISION Development Plan and Spread of Performance Reflecting the Needs of Government and Society
<table>
<thead>
<tr>
<th>Professor</th>
<th>Major</th>
<th>Telephone</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kang, Namcheol</td>
<td>Machine &amp; Human Dynamics</td>
<td>053) 950-7545</td>
<td><a href="mailto:nckang@knu.ac.kr">nckang@knu.ac.kr</a></td>
</tr>
<tr>
<td>Kang, Bo Yeong</td>
<td>Intelligence robot</td>
<td>053) 950-7542</td>
<td><a href="mailto:kby09@knu.ac.kr">kby09@knu.ac.kr</a></td>
</tr>
<tr>
<td>Kim, Hyun-Deok</td>
<td>Telecommunications</td>
<td>053) 950-7578</td>
<td><a href="mailto:undkim@ee.knu.ac.kr">undkim@ee.knu.ac.kr</a></td>
</tr>
<tr>
<td>Roh, Yong Rae</td>
<td>Acoustic vibration</td>
<td>053) 950-6828</td>
<td><a href="mailto:yryong@knu.ac.kr">yryong@knu.ac.kr</a></td>
</tr>
<tr>
<td>Park, Soon-Yong</td>
<td>Robot vision</td>
<td>053) 950-7575</td>
<td><a href="mailto:sypark@knu.ac.kr">sypark@knu.ac.kr</a></td>
</tr>
<tr>
<td>Byeon, Clare C</td>
<td>Optics and Photonics</td>
<td>053) 950-7511</td>
<td><a href="mailto:byeon@knu.ac.kr">byeon@knu.ac.kr</a></td>
</tr>
<tr>
<td>Suh, Jung-wook</td>
<td>Robot mechanism</td>
<td>053) 950-4567</td>
<td><a href="mailto:jwsuh@knu.ac.kr">jwsuh@knu.ac.kr</a></td>
</tr>
<tr>
<td>Lee, Dong-Eun</td>
<td>Building Management</td>
<td>053) 950-7540</td>
<td><a href="mailto:dolee@knu.ac.kr">dolee@knu.ac.kr</a></td>
</tr>
<tr>
<td>Lee, Sang Ryong</td>
<td>Automation</td>
<td>053) 950-5579</td>
<td><a href="mailto:srlee@knu.ac.kr">srlee@knu.ac.kr</a></td>
</tr>
<tr>
<td>Lee, Sangmoon</td>
<td>Cyber Physical System</td>
<td>053) 950-5509</td>
<td><a href="mailto:moony@knu.ac.kr">moony@knu.ac.kr</a></td>
</tr>
<tr>
<td>Lee, Yun-Jung</td>
<td>Intelligence robot</td>
<td>053) 950-6562</td>
<td><a href="mailto:yjlee@ee.knu.ac">yjlee@ee.knu.ac</a></td>
</tr>
<tr>
<td>Lee, Yong Joong</td>
<td>Nano material measurement</td>
<td>053) 950-6574</td>
<td><a href="mailto:yjlee76@knu.ac.kr">yjlee76@knu.ac.kr</a></td>
</tr>
<tr>
<td>Lee, Joon-Woo</td>
<td>Robotics</td>
<td>053) 950-5602</td>
<td><a href="mailto:jwl@knu.ac.kr">jwl@knu.ac.kr</a></td>
</tr>
<tr>
<td>Lee, Ho</td>
<td>Laser and Bio engineering</td>
<td>053) 950-5572</td>
<td><a href="mailto:holee@knu.ac.kr">holee@knu.ac.kr</a></td>
</tr>
<tr>
<td>Hwang, Chang Soon</td>
<td>Robot system</td>
<td>053) 950-7516</td>
<td><a href="mailto:robot@knu.ac.kr">robot@knu.ac.kr</a></td>
</tr>
</tbody>
</table>
2020 Spring Semester Admission Guide for International Graduate Students
# Admission to ITA Departments

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Time</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Application</td>
<td>October 28(Mon) to November 8(Fri), 2019 by 18:00</td>
<td>Refer to KNU website (<a href="http://en.knu.ac.kr">http://en.knu.ac.kr</a>)</td>
</tr>
<tr>
<td>Submission of Application Documents</td>
<td>October 28(Mon) to November 15(Fri), 2019 by 18:00</td>
<td>Office of International Affairs(Global Plaza 608), Required documents ⑤ ①~⑫</td>
</tr>
<tr>
<td>Screening Qualifications</td>
<td>November 18(Mon) to 25(Mon), 2019</td>
<td>Office of International Affairs</td>
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<tr>
<td>Department Interviews</td>
<td>November 27(Wed) to December 6(Fri), 2019</td>
<td>Departments will notice with an interview schedule</td>
</tr>
<tr>
<td>Submission of Financial Documents</td>
<td>December 16(Mon) to 23(Mon), 2019</td>
<td>Financial documents indicating funds of about USD18,000 can be submitted with the application forms</td>
</tr>
<tr>
<td>Admissions Committee Screening</td>
<td>By December 24(Tue), 2019</td>
<td></td>
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<tr>
<td>Graduate School Council Screening</td>
<td>By December 27(Fri), 2019</td>
<td></td>
</tr>
<tr>
<td>Notification of Admission Results</td>
<td>December 31(Tue), 2019 expected</td>
<td>(Korean) <a href="http://gp.knu.ac.kr">http://gp.knu.ac.kr</a> (English) <a href="http://en.knu.ac.kr">http://en.knu.ac.kr</a></td>
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<tr>
<td>Certificate of Admission</td>
<td>From middle of January, 2020</td>
<td>· Overseas residents: EMS post with address written on application</td>
</tr>
<tr>
<td></td>
<td></td>
<td>· In Korea residents: Pick up by visiting the Office of International Affairs after tuition payment</td>
</tr>
<tr>
<td>Registration</td>
<td></td>
<td>Tuition Invoice: Applicants can pick it up from the Office of International Affairs</td>
</tr>
<tr>
<td>Submission of Academic Verification Documents</td>
<td>By February 28(Fri), 2020</td>
<td></td>
</tr>
</tbody>
</table>
1. Full or partial tuition fee supports for outstanding students
2. Research / Teaching Assistantships
3. Students who have outstanding research achievements are sent to foreign universities for one semester to support overseas joint research
4. Supports to Conference/Workshop paper presentation
5. Dormitory house is available for the international students
Office of International Affairs
1. Address: Office of International Affairs, Kyungpook National University (Global Plaza, Room No. 608) 80 Daehak-ro, Buk-gu, Daegu, 41566, Republic of Korea
2. Homepage: http://en.knu.ac.kr
3. Person in Charge: Haejin Shin(Ms.)
4. Contact: (Tel) +82-53-950-2436, (Fax) +82-53-950-2419, (E-mail) admission@knu.ac.kr

Office of ITA Convergence Teaching
1. Address: Office of Convergence Teaching, Kyungpook National University (Techno Building, Room No. 510) 80 Daehak-ro, Buk-gu, Daegu, 41566, Republic of Korea
2. Homepage: http://aist.knu.ac.kr/
3. Person in Charge: Ji Hye Kwon(Ms.)
4. Contact: (Tel) +82-53-950-3883, (E-mail) kjh0412@knu.ac.kr