

# Laboratory Openings

## for 2019 Summer DGIST Research Internship for Undergraduates

Program Period: June 24 ~ August 2, 2019 (6 weeks)

**DGIST Research Internship for Undergraduates** aims to provide talented Korean and international students with opportunities to experience research environment of DGIST. Participants will serve their internship at the lab of their choice under the guidance of DGIST faculty members as visiting research students. This summer research session for international students will provide students with valuable experience in research and personal growth while immersed in a foreign culture.

### OVERVIEW

**Program Period** June 24 – August 2, 2019 (6 weeks)

*\* The schedule may be subject to change, depending on the circumstances*

**Application**

- **Period:** March 8 to April 7, 2019 (KST, UTC +09:00)
- **Application:** [irt@dgist.ac.kr](mailto:irt@dgist.ac.kr)
- **Documents:**
  - Application form
  - A digital copy of academic transcript in English
  - A copy of English Language Proficiency Test Certificate
  - Copy of passport
  - A letter of recommendation (to be directly submitted by academic advisor or faculty member to [irt@dgist.ac.kr](mailto:irt@dgist.ac.kr))

**Benefits**

Financial Support for Housing and Meals

On Campus Housing, Korean Culture

Experience Activities

### RESEARCH AREA

Various research topics of 6 departments in DGIST Graduate School

- **Emerging Materials Science**
- **Information & Communication Engineering**
- **Robotics Engineering**
- **Energy Science & Engineering**
- **Brain & Cognitive Sciences**
- **New Biology**

## LAB OPENINGS

### 1. Emerging Materials Science

Lab	Professor	Research Area	Homepage
Micro Laser	Chil-Min KIM	<ul style="list-style-type: none"> <li>◦ Theoretical &amp; Experimental Research               <ul style="list-style-type: none"> <li>- Classical and Quantum chaos</li> <li>- Hermitian and Non-Hermitian Physics in Micro-cavity</li> <li>- Nano Photonics</li> </ul> </li> <li>◦ Applications               <ul style="list-style-type: none"> <li>- Unidirectional / Ultra High Q-factor Micro Laser</li> <li>- Optoelectronic Circuit</li> <li>- Absorption Enhanced Nanowire</li> <li>- Chemical &amp; Biological Sensors</li> </ul> </li> </ul>	<a href="https://chaos.dgist.ac.kr/">https://chaos.dgist.ac.kr/</a>

### 2. Information and Communication Engineering

Lab	Professor	Research Area	Homepage
Advanced Electronic Devices Research Group	Hyuk-Jun KWON	<ul style="list-style-type: none"> <li>◦ Flexible/Wearable Electronics</li> <li>◦ Next generation displays, memory devices, and multi-functional sensors</li> <li>◦ New concept of micro/nano fabrication: Short pulse light process (e.g. laser, flash)</li> <li>◦ Micro/nano heat transfer and mechanical stress analysis for electrical devices</li> </ul>	<a href="http://nanotech.dgist.ac.kr/">http://nanotech.dgist.ac.kr/</a>

### 3. Robotics Engineering

Lab	Professor	Research Area	Homepage
Multiscale Biomedical Robotics	Sukho PARK	<ul style="list-style-type: none"> <li>◦ Design and fabrication of cell and/or drug delivery microrobot</li> <li>◦ Design and fabrication of shape change soft microrobot</li> <li>◦ Fundamental technology of biomedical micro/nano robot actuation</li> </ul>	<a href="http://mbr.dgist.ac.kr/">http://mbr.dgist.ac.kr</a>
Surgical Robotics	Jaesung HONG	<ul style="list-style-type: none"> <li>◦ Design and fabrication of surgical robots</li> <li>◦ Development of elemental technologies for surgical navigation</li> </ul>	<a href="http://sr.dgist.ac.kr/">http://sr.dgist.ac.kr/</a>
Bio-Micro Robotics	Hongsoo CHOI	<ul style="list-style-type: none"> <li>◦ Microrobots for precise drug delivery and surgery</li> <li>◦ Design and fabrication of three-dimensional microrobot for biomedical applications</li> <li>◦ MEMS ultrasonic transducers for cell stimulation</li> </ul>	<a href="http://mems.dgist.ac.kr/">http://mems.dgist.ac.kr/</a>
Neural Interface & Microsystems	Sohee KIM	<ul style="list-style-type: none"> <li>◦ Understanding of technical components of BMI (brain-machine interface)</li> <li>◦ Understanding of bioelectric signals from brain and muscles</li> <li>◦ Understanding of the relationship between mechanical properties and processing parameters in fabricating polymer-based MEMS devices</li> </ul>	<a href="http://nims.dgist.ac.kr/">http://nims.dgist.ac.kr/</a>

Rehabilitation Engineering	Jonghyun KIM	<ul style="list-style-type: none"> <li>◦ Evaluation of motor imagery-based robot-aided rehabilitation using fNIRS and EEG</li> <li>◦ Control and analysis of interactive treadmill robot for gait rehabilitation</li> <li>◦ Development of wearable sensor for spasticity assessment</li> </ul>	<a href="http://rehab.dgist.ac.kr">http://rehab.dgist.ac.kr</a>
SMART Lab	Cheol SONG	<ul style="list-style-type: none"> <li>◦ Design and study of multi-degree of freedom robot mechanism using small scale precision motors</li> <li>◦ In-vivo blood flow measurement using an optical system</li> <li>◦ Study on properties of biological specimen using laser</li> <li>◦ Study of micro-surgical training using a virtual reality(VR)</li> </ul>	<a href="https://smart.dgist.ac.kr/">https://smart.dgist.ac.kr/</a>
Motion Control	Sehoon OH	<ul style="list-style-type: none"> <li>◦ Design and control of exoskeleton/exercise/assistive robot</li> <li>◦ High speed high precision control of linear motor</li> <li>◦ Locomotion control of biped/quadruped robot</li> <li>◦ Biomechanics and human motion analysis</li> </ul>	<a href="http://control.dgist.ac.kr/">http://control.dgist.ac.kr/</a>
Bio Robot & Mechatronics	Dongwon YUN	<ul style="list-style-type: none"> <li>◦ Biomimetic Robot</li> <li>◦ Soft Robotics</li> <li>◦ Robot elementary technology: Sensors and actuators</li> <li>◦ Study on the medical application</li> <li>◦ Study on the industrial/military application</li> </ul>	<a href="http://brm.dgist.ac.kr/">http://brm.dgist.ac.kr/</a>
Nano Materials & Devices	Hoejoon KIM	<ul style="list-style-type: none"> <li>◦ Fabrication of graphene integrated soft electronics</li> <li>◦ Development of piezoelectric sensor for fine-dust detection</li> <li>◦ Process development for semiconductor devices</li> </ul>	<a href="http://joonkim.dgist.ac.kr">http://joonkim.dgist.ac.kr</a>
Medical image & Signal processing	Sanghyun PARK	<ul style="list-style-type: none"> <li>◦ Segmentation of interest organs or vessels using machine learning</li> <li>◦ Surgical robot detection and tracking algorithm</li> <li>◦ Development of brain image processing tools</li> </ul>	<a href="http://mispl.dgist.ac.kr/">http://mispl.dgist.ac.kr/</a>
Intelligent Imaging & Vision Systems	Inkyu MOON	<ul style="list-style-type: none"> <li>◦ Fully Connected Neural Networks Design for classification of biomedical images</li> <li>◦ Convolutional Neural Networks Design for classification of biomedical images</li> <li>◦ Recurrent Neural Networks Design for analysis of biomedical images</li> <li>◦ Generative Adversarial Networks Design for analysis of biomedical images</li> <li>◦ Deep learning-based intelligent biomedical imaging systems design</li> </ul>	<a href="https://iivs.dgist.ac.kr/">https://iivs.dgist.ac.kr/</a>

#### 4. Energy Science and Engineering

Lab	Professor	Research Area	Homepage
Advanced Energy Materials	Sangaraju SHANMUGAM	<ul style="list-style-type: none"> <li>◦ Development of hydrogen production (HER, OER) electrocatalysts using water electrolysis, ORR catalysts for polymer electrolyte fuel cells</li> <li>◦ Synthesis of polymer electrolyte membrane applicable to fuel cell and vanadium redox flow battery</li> <li>◦ Preparation of one-dimensional nanostructures and evaluation of zinc/lithium-air battery performance</li> </ul>	<a href="http://sangarajus.dgist.ac.kr">http://sangarajus.dgist.ac.kr</a>

## 5. Brain and Cognitive Sciences

Lab	Professor	Research Area	Homepage
Locomotor Neurocircuit	Myungin BAEK	<ul style="list-style-type: none"> <li>Our lab is studying the development and evolution of neuronal circuit for locomotion. We are actively using most advanced tools in the field, including next generation sequencing to identify genetic pathways regulating locomotor neuro circuits development during evolution.</li> </ul>	<a href="https://locomotion.dgist.ac.kr/">https://locomotion.dgist.ac.kr/</a>
Brain Signal and Synapse Research	Byungchang SUH	<ul style="list-style-type: none"> <li>We are interested in Lipidomics, ion channel regulation, and molecular mechanism of epilepsy and pain in animals.</li> </ul>	<a href="https://locomotion.dgist.ac.kr/">https://locomotion.dgist.ac.kr/</a>

## 6. New Biology

Lab	Professor	Research Area	Homepage
Cell Signaling and Development	June M KWAK	<ul style="list-style-type: none"> <li>The ultimate goal of our lab is, using multidisciplinary approaches, to help predict physiological and genetic changes in plants in response to global climate change.</li> <li>Study of genetic and epigenetic mechanisms regulating plant growth and aging in response to environmental cues.</li> <li>Single-cell genomics and genetics.</li> <li>Unraveling of cellular mechanisms and developmental programs</li> <li>Detailed understanding of cellular network models for second messengers Ca<sup>2+</sup> and ROS</li> </ul>	<a href="http://dgist.kwaklab.org/">http://dgist.kwaklab.org/</a>
Odorant Receptor (ORLab)	JaeHyung KOO	<ul style="list-style-type: none"> <li>Brain function through microbiota-/pathogen-derived metabolites</li> <li>Metabolism based on metabolites/receptors interaction</li> <li>Diseases via ectopic odorant GPCRs (AD, Meningitis, Depression, Aging, Diabetes, Obesity)</li> </ul>	<a href="https://jkoo001.dgist.ac.kr/">https://jkoo001.dgist.ac.kr/</a>
BioDr.Lab-Nanobiomedicine	Minseok S. KIM	<ul style="list-style-type: none"> <li>Nanobiotechnology</li> <li>Nanomedicine</li> <li>Aging recovery technology</li> <li>In vitro diagnostics</li> <li>Biomimetic system</li> <li>BioMEMS</li> </ul>	<a href="https://biodr.dgist.ac.kr/">https://biodr.dgist.ac.kr/</a>
QBIO and Precision Medicine	Min-Sik KIM	<ul style="list-style-type: none"> <li>Development of high resolution mass spectrometry-based Proteomics technologies</li> <li>MS-based cancer proteogenomics study</li> <li>Understanding through proteome dynamics</li> <li>Systems analysis of post-translational modifications</li> <li>Development and application of clinical MS</li> <li>Molecular multi-omics to study central dogma of molecularbiology</li> </ul>	<a href="https://mass.dgist.ac.kr/">https://mass.dgist.ac.kr/</a>

Single-cell Genomics	Jong Kyoung KIM	<ul style="list-style-type: none"> <li>◦ Single-cell genomics</li> <li>◦ Genome editing and screening</li> <li>◦ Understanding heterogeneity of tumor and stem cells</li> <li>◦ Developing machine learning algorithms for analyzing biological big data</li> </ul>	<a href="https://scg.dgist.ac.kr/">https://scg.dgist.ac.kr/</a>
Protein Structure Aging	Jin Hae KIM	<ul style="list-style-type: none"> <li>◦ Studies to understand structural changes of proteins by aging and diseases</li> <li>◦ Elucidation of protein misfolding and the related pathogenic mechanisms</li> <li>◦ Structure-based development of therapeutic materials and strategy</li> <li>◦ Studies to reveal protein interaction network mediating structural transition</li> <li>◦ Characterization of protein structures and functions</li> </ul>	<a href="http://newbiology.dgist.ac.kr/?p=1637">http://newbiology.dgist.ac.kr/?p=1637</a>
Complexbiology	Hong Gil NAM	<ul style="list-style-type: none"> <li>◦ The genetic nature of aging clock</li> <li>◦ New aging regulatory mechanisms</li> <li>◦ The physio-chemical changes of aging and dying cells</li> <li>◦ Re-programming of aging and age-associated diseases (B-SL track)</li> </ul>	<a href="https://cbrg.dgist.ac.kr/">https://cbrg.dgist.ac.kr/</a>
Nano/Bio Imaging	Dae Won MOON	<ul style="list-style-type: none"> <li>◦ Omni-Molecular Secondary Ion Mass Spectrometry Imaging of Cells and Tissues</li> <li>◦ Ambient mass imaging for live cells and tissues</li> <li>◦ Single Protein Imaging with He Ion Microscopy</li> <li>◦ Medium Energy Ion Scattering Spectroscopy for nanoparticles and liquid interface</li> <li>◦ Coherent Anti-Stokes Raman Scattering for Lipids Imaging</li> <li>◦ Meso-Nano Convergence Biology</li> </ul>	<a href="https://dwmoon.dgist.ac.kr/index.htm">https://dwmoon.dgist.ac.kr/index.htm</a>
Protein Engineering	Kyungmoo YEA	<ul style="list-style-type: none"> <li>◦ Development of antibody therapeutics</li> <li>◦ Establishment of new platform Tech for antibody selection</li> <li>◦ Antibody engineering</li> <li>◦ Cell to cell communication</li> </ul>	<a href="https://www.yeantibody.com/">https://www.yeantibody.com/</a>
Plant Molecular Communication	Hye Ryun WOO	<ul style="list-style-type: none"> <li>◦ Molecular genetic regulation of multi-stress responses</li> <li>◦ Small peptide-mediated control of plant senescence</li> <li>◦ Epigenetic regulatory mechanisms on leaf senescence</li> <li>◦ Coordination programs for leaf growth and senescence</li> <li>◦ Regulatory mechanisms on cell division and aging in plant meristem</li> </ul>	<a href="http://newbiology.dgist.ac.kr/?p=611">http://newbiology.dgist.ac.kr/?p=611</a>
Protein Homeostasis and Drug Discovery	Byung-Hoon LEE	<ul style="list-style-type: none"> <li>◦ Ubiquitin-proteasome system</li> <li>◦ 'Induced proteolysis' as a new therapeutic paradigm</li> <li>◦ Protein homeostasis</li> <li>◦ Protein diseases or proteopathies</li> <li>◦ Small-molecule chemical screening and drug discovery for targeting human diseases</li> </ul>	<a href="https://phdd.dgist.ac.kr/">https://phdd.dgist.ac.kr/</a>
Senescence-Associated Mechanism (SAM Lab)	Young-Sam LEE	<ul style="list-style-type: none"> <li>◦ Deciphering molecular mechanisms of cellular senescence</li> <li>◦ Identifying factors for controlling cellular senescence and determining their underlying molecular mechanisms of action</li> <li>◦ Interpreting structural-functional relationships of proteins regulating DNA replication and repair</li> </ul>	<a href="http://newbiology.dgist.ac.kr/?p=1427">http://newbiology.dgist.ac.kr/?p=1427</a>

Aging, Metabolism and Physiology	Jaemin LEE	<ul style="list-style-type: none"> <li>◦ Metabolism</li> <li>◦ Diabetes and obesity</li> <li>◦ Neuronal control on energy metabolism</li> <li>◦ Hormonal regulation of metabolism</li> <li>◦ Cellular stress and signal transduction responses</li> </ul>	<a href="https://physiology.dgist.ac.kr/">https://physiology.dgist.ac.kr/</a>
Cellular Biophysics And Advanced Bioimaging	Jong-Chan LEE	<ul style="list-style-type: none"> <li>◦ Study of cellular nanostructures with super-resolution optical fluorescence imaging</li> <li>◦ Study of nanometric conformation or binding dynamics of biomolecules using single molecule fluorescence resonance energy transfer (smFRET)</li> <li>◦ Study of transcription and translation dynamics of single mRNAs in response to cellular stress</li> <li>◦ Study of protein-protein interactions inside a cell using single-molecule pull-down (SiMPull)</li> <li>◦ Single-molecule optogenetics</li> </ul>	<a href="https://sites.google.com/view/jcleelab/home">https://sites.google.com/view/jcleelab/home</a>
Plant Senescence	Pyung Ok LIM	<ul style="list-style-type: none"> <li>◦ RNA-based regulatory network in leaf senescence</li> <li>◦ Evolutionary mechanisms of leaf senescence in Arabidopsis</li> <li>◦ Phenome-based quantification of plant aging</li> <li>◦ Reprogramming of plant aging and longevity, and its application to the bioenergy crop</li> </ul>	<a href="https://cbrg.dgist.ac.kr/">https://cbrg.dgist.ac.kr/</a>
Stem Cell Biology and Cancer Precision Medicine	Youngtae JEONG	<ul style="list-style-type: none"> <li>◦ Stem cell biology &amp; Regenerative Medicine</li> <li>◦ Organogenesis</li> <li>◦ Cancer stem cells</li> <li>◦ Targeted therapy &amp; Precision medicine</li> <li>◦ Stem cell and tumor microenvironment</li> </ul>	<a href="https://www.stemcancerbio.com/">https://www.stemcancerbio.com/</a>

## CONTACT

Please feel free to contact us with questions, comments, or requests for information.

### International Affairs Team, DGIST

Add: 333, Techno Jungang Daero, Hyeonpung-Eup, Dalseong-Gun, Daegu, 42988, Republic of Korea

Email: [irt@dgist.ac.kr](mailto:irt@dgist.ac.kr)

Tel: +82 53 785 1164

Fax: +82 53 785 1139