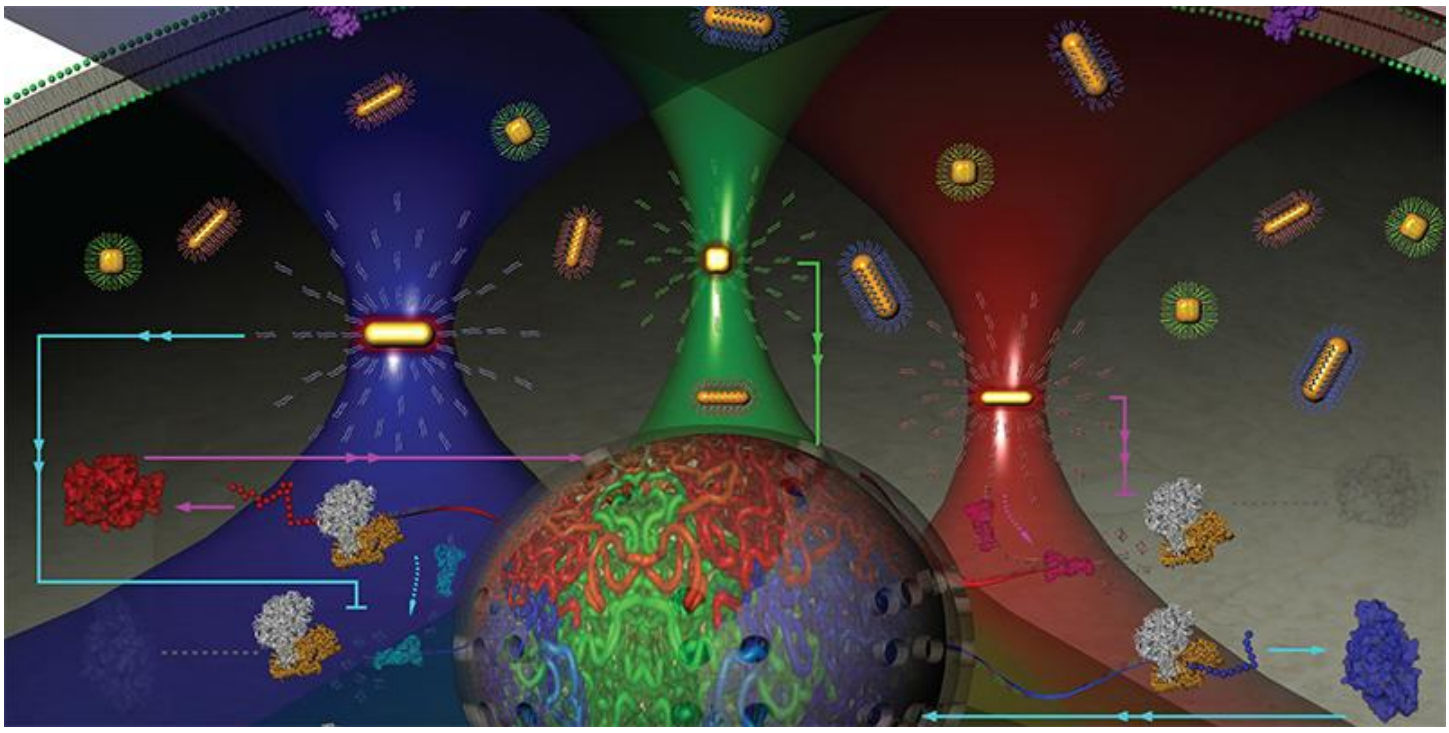
SKKU Graduate School

Department of **Biophysics**



The international Ph.D. program in Precision Medicine for M.D.s

SUNG KYUN KWAN UNIVERSITY(SKKU)

International SKKU Ph.D. program for M.D.s

"Fully funded international Ph.D. program in Precision Medicine for M.D.s"

The Institute of Quantum Biophysics (IQB) at SKKU offers a unique Ph.D. training program for passionate clinicians, who would like to engage the fundamental knowledge of molecular biophysics and precision engineering of life sciences, as pioneers to seek preventive precision medicine pathways and solve unexplored health problems including neurodegenerative diseases, cancers, and infectious diseases as well as other diseases .

Through the pioneering international collaboration between the faculty members of SKKU, UC Berkeley, and Harvard Medical School, this international Ph.D. program is prepared for optimum training of physician-scientists. For transformative medicine, this international scholar program offers students a unique opportunity to pursue a Ph.D. degree under the supervision of faculty from the SKKU and Berkeley or Harvard Medical School. Students are co-advised and perform international collaborative team research in both sciences and medicine, in both countries, so that students can gain the wisdom and knowledge of expertise, the rigor of critical thinking, the depth of research, and authentic scientific culture at both institutions.

Since the mission of international SKKU Ph.D. program in precision medicine is to train outstanding physician (M.D.)-scientists (Ph.D.) and cultivate leaders who can generate critical insights into global healthcare obstacles by obtaining both *fundamental scientific inquiry* and *practical implementation of solutions* at the interface of biology, chemistry, physics, engineering, and medicine, this Ph.D. program in precision medicine is also integrated with the Samsung Advanced Institute of Health Sciences and Technology (SAIHST) at the Samsung Medical Center, SKKU School of Medicine.

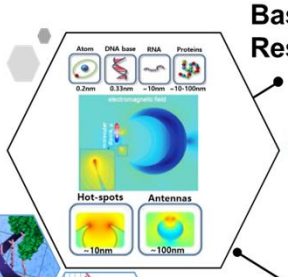
Through our unique partnership with the SAIHST and innovative sciences at the IQB, Ph.D. students of this program will gain an in-depth and systematic understanding of quantitative biology and precision medicine in order to create innovative medical devices, such as bioelectronic Rx, molecular pacemaker, ultrafast precision molecular diagnostic systems (iMDx) on chip, minibrains for Alzheimer's disease, Parkinson's disease, or brain tumor models as well as other organoids on chip with quantum nanotechnology and health information technology for low-cost healthcare integrated systems and 5P medicine (preventive, predictive, participatory, personalized, and precision medicine).

Graduates of the international Ph.D. program in precision medicine will be innovators, authentic investigators, and educators in transformative medicine. The signature features of the international Ph.D. program in precision medicine are realistic science and scientific practices, the passionate teamwork of outstanding clinicians, scientists and engineers, and nurturing environment for exceedingly brilliant students, who share a lifelong commitment to understanding the global healthcare and preventive medicine at all its levels of function.

Financial support

Students who already finished M.D. degree can apply to this international Ph.D. program in Precision Medicine. All students admitted to this Ph.D. program are fully supported by the HK Lee scholarship that provides a living stipend and tuition up to 4 years, which includes 2 years scholarship as visiting Ph.D. student researchers at Harvard Medical School or Berkeley based on the intensive research performance.

Basic Scientific Research



- ***Fundamental scientific inquiry*** **for global healthcare obstacles** a deep and systematic understanding of ***quantum effects*** *in biology, medical limitations*, and successful inventions of novel and highly integrated quantum biotechnology.

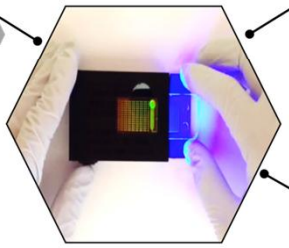
International Cooperation

- **Global research hub** for quantum biophysics.

SUNG KYUN KWAN UNIVERSITY (SKKU)
Berkeley
UNIVERSITY OF CALIFORNIA

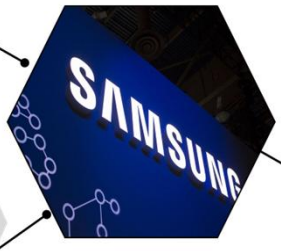
Education

- Training for ***next-generation human resources*** through **Dept. of Biophysics**.



5P Medicine by Quantum Biological ICs (QBICs)

- **Quantum plasmonics, quantum dots, carbon quantum dots, or graphene quantum dots-based integrated nano- or microfluidic circuits** for (1) understanding *quantum biological electron transfer (QBET)* in living cells; (2) *investigating the role of QBET* in the organogenesis; and (3) creating *ultrafast precision molecular diagnostic systems* for ***predictive medicine***, which would have an immense impact on preventive healthcare.



Development & Industrialization

- **Commercially available QBICs devices** through industry-academia cooperation with Samsung Electronics, Samsung Display, and on-campus venture companies.

Organization

EDUCATION

Department of Biophysics

Berkeley-Harvard-SKKU (International Cooperation)	SAIHST-IQB (Medical Cooperation)	Industry-IQB (Industry-Academia Cooperation)

RESEARCH

Institute of Quantum Biophysics (IQB)

Group1	Group2	Group3	Group4
Theoretical, Computational, and Design (TCAD)	Experimental Quantum Biophysics (EQB)	Quantum Biological ICs (QBICs) Medicine	Large-scale Advanced Manufacturing Platform (LAMP)

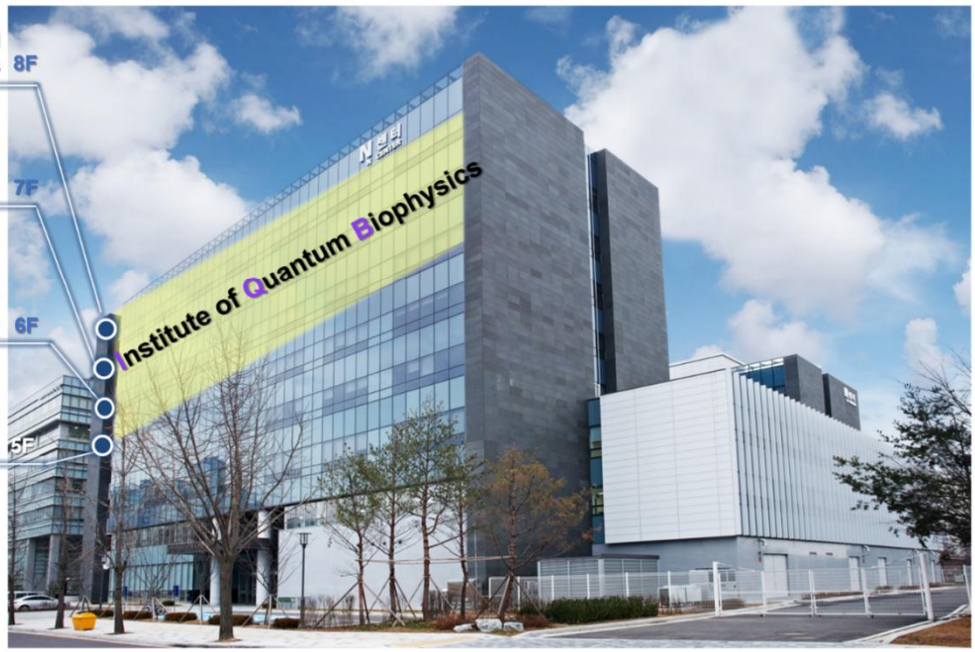
Institute of Quantum Biophysics Building

Center for **Large-scale Advanced Manufacturing Platform (LAMP) for IQBICs** 8F

Center for **Quantum Biological ICs (QBICs) Medicine** 7F

Center for **Experimental Quantum Biophysics (EQB)** 6F

Center for **Theoretical, Computational, and Design (TCAD)** 5F



N-Center 5F-8F

Curriculum

Core (3Q)	Quantum Biophysics Quantum Bioelectronics and Applications Quantitative Precision Medicine
Advanced	**Basic Biophysics and Basic Science** Molecular Cell Biology / Biochemistry / Quantitative Organogenesis / Nano Optics / Quantum Biomaterials / etc. **Basic Medical Science** Molecular Medical Diagnosis / Human Physiology / Medical Imaging / etc. **Bio Chip Technology** Lab-On-Chip / Medical IC /Bio MEMS / Biochip design and fabrication / Molecular Diagnostics on Chip / etc.

Admissions

2019 Spring Graduate School Application Schedule

- **Application** : December 17th – 20, 2018 (On-site)
- **Documents Submission** : December 17th – 20, 2018 (On-site)
- **Interview** : December 17th – 20th, 2018 (On-site)
- **Requirements:**
  1) Application Form
  2) Self-Introduction & Study Plan
  3) Consent of Academic Inquiry & Letter of Request for Academic Inquiry
  4) Documents Concerning Nationality of the Applicant and His/Her Parents
  5) Certificate of Language Proficiency
  6) Graduation Certificate of Undergraduate School (expecting to graduate) & Undergraduate School Transcript with Every Completed Class with Notarization & Embassy Legalization or Apostille
  7) Document Proving Financial Ability (Tuition & Living Expenses)

※ For more information : https://gradschool.skku.edu/

Contact

Department of Biophysics Office

Homepage http://biophysics.skku.edu
Tel 031) 299-4790
Email minetkim@skku.edu
Address #86571 N-Center, Sungkyunkwan University(SKKU), Suwon, South Korea

S K K U G r a d u a t e S c h o o l

Institute of Quantum Biophysics(IQB)

Dept. of Biophysics

SUNG KYUN KWAN UNIVERSITY(SKKU)

“Fully funded international Ph.D. program in Precision Medicine for M.D.s”

The Institute of Quantum Biophysics (IQB) at SKKU offers a unique Ph.D. training program for passionate clinicians, who would like to engage the fundamental knowledge of molecular biophysics and precision engineering of life sciences, as pioneers to seek preventive precision medicine pathways and solve unexplored health problems including neurodegenerative diseases, cancers, and infectious diseases as well as other diseases.

Through the pioneering international collaboration between the faculty members of SKKU, UC Berkeley, and Harvard Medical School, this international Ph.D. program is prepared for optimum training of physician-scientists. For transformative medicine, this international scholar program offers students a unique opportunity to pursue a Ph.D. degree under the supervision of faculty from the SKKU and Berkeley or Harvard Medical School. Students are co-advised and perform international collaborative team research in both sciences and medicine, in both countries, so that students can gain the wisdom and knowledge of expertise, the rigor of critical thinking, the depth of research, and authentic scientific culture at both institutions.

Since the mission of international SKKU Ph.D. program in precision medicine is to train outstanding physician (M.D.)-scientists (Ph.D.) and cultivate leaders who can generate critical insights into global healthcare obstacles by obtaining both *fundamental scientific inquiry* and *practical implementation of solutions* at the interface of biology, chemistry, physics, engineering, and medicine, this Ph.D. program in precision medicine is also integrated with the Samsung Advanced Institute of Health Sciences and Technology (SAIHST) at the Samsung Medical Center, SKKU School of Medicine.

Through our unique partnership with the SAIHST and innovative sciences at the IQB, Ph.D. students of this program will gain an in-depth and systematic understanding of quantitative biology and precision medicine in order to create innovative medical devices, such as bioelectronic Rx, molecular pacemaker, ultrafast precision molecular diagnostic systems (iMDx) on chip, minibrains for Alzheimer’s disease, Parkinson’s disease, or brain tumor models as well as other organoids on chip with quantum nanotechnology and health information technology for low-cost healthcare integrated systems and 5P medicine (preventive, predictive, participatory, personalized, and precision medicine).

Graduates of the international Ph.D. program in precision medicine will be innovators, authentic investigators, and educators in transformative medicine. The signature features of the international Ph.D. program in precision medicine are realistic science and scientific practices, the passionate teamwork of outstanding clinicians, scientists and engineers, and nurturing environment for exceedingly brilliant students, who share a lifelong commitment to understanding the global healthcare and preventive medicine at all its levels of function.

Financial support

Students who already finished M.D. degree can apply to this international Ph.D. program in Precision Medicine. All students admitted to this Ph.D. program are fully supported by the HK Lee scholarship that provides a living stipend and tuition up to 4 years, which includes 2 years scholarship as visiting Ph.D. student researchers at Harvard Medical School or Berkeley based on the intensive research performance.

Department of Biophysics,
Institute of Quantum Biophysics(IQB), SKKU

1. Educational Goal

Convergent Talent Training	A pairing program in which students from MD and basic science/engineering backgrounds study via multidisciplinary co-advisor system
Cultivating Research-Intensive Leader	Strengthen the quality of research capability by joining the research team of IQB during the course in the Ph.D. degree
Fostering Global Specialists	Participate in international cooperation research through global research program Opportunities for overseas training (up to 2yrs)
Nobel Prize Potential Scientist	Solving key medical issues as a new academic leader who integrates precision medicine and engineering with the fundamental quantum biophysics

2. Research Area

- **Purpose driven theoretical and computational quantum biophysics**
  - Quantum energy flow in light harvesting antenna complex.
  - Extensive *quantum biological electron transfer (QBET)*simulations.
  - Simulations of QBET-based Rx.
  - Quantum biological integrated circuits(*QBICs*) device design and simulations.
- **Basic quantum biology and biophysics**
  - *In vitro* /QBET in living fluidic system, quantum biological device-based optofluidics.
  - *In vivo* /Light-driven quantum biological ET modulations of living.
  - Applied quantum biology and biophysics /Quantum biomaterials and quantum biological interface devices (QBIDs).
- **QBICs to create ultrafast precision molecular diagnostic systems for predictive medicine**
  - QBICs-based ultrafast precision molecular diagnostic systems (iMDx) and its network for medical AI systems.
  - QBICs-based microphysiological analysis platform (MAP): cancer MAP, cancer-immune system MAP, minibrainMAP, microbiome-brain-immune system MAP (gut feeling on chip), cardiac MAP, pancreatic MAP, liver MAP, etc.
- **Innovative large-scale manufacturing of integrated biological reagents, quantum devices for excitation, amplifications, and detections in microfluidic circuits.**
  - Large-scale manufacturing technology of Low-cost Advanced *Microfluidic Biochips* (LAMB) from QBICs: QBIC LAMB.

3. Curriculum

Core(3Q)	**Quantum Biophysics** **Quantum Bioelectronics and Applications** **Quantitative Precision Medicine**
Basics & Advanced	**Basic Biophysics and Basic Science** Molecular Cell Biology / Biochemistry / Quantitative Organogenesis / Nano Optics / Physical Chemistry / Quantum Biomaterials / etc. **Basic Medical Science** Quantitative Life Science by Micro Fluidics / Molecular Medical Diagnosis / Human Physiology / Medical Imaging **Bio Chip Technology** Lab-On-Chip / Medical IC / Bio MEMS / Biochip Design and Fabrication / Molecular Diagnostics on Chip

2019 Spring(3rd) Admission Guide of Graduate School Application for International Students

1. Recruitment Event : Combined Master & Ph.D. Course

- Graduates for medical college (12 vacancies)
- Graduates for science/engineering (12 vacancies)

2. Application Schedule

	Schedule	Remarks
Application	Jan. 7 (Mon.) ~ Jan. 14 (Mon.), 2019	https://admission-global.skku.edu After completing the online application, all applicants must submit their documents to the Office of International Student Services in person or by post.
Interview Test	Jan. 21 (Mon.), 2019	
Announcement of Acceptance	Jan. 28 (Tue.), 2019	
Registration	Feb. 1 (Fri.) ~ Feb. 15 (Fri.), 2019	

※ Please, check the specific information at SKKU admission homepage (https://admission-global.skku.edu)

3. Advantages

- Official language in dept. of biophysics is English.
- 100% English in all coursework classes, technical seminars, special lectures.
- Scholarship covers tuition and living expenses.
- Opportunity for international cooperative research.

Dept. of Biophysics Office
Contact : +82-31-299-4790, minetkim@skku.edu Homepage : https://biophysics.skku.edu