[KRIBB] Study Proposal of International Admission for 2020 Fall Semester

No.	Major	Sub-Major	Research Group (Team)	Study and Research Proposal
1	Biosicence	Functional Genomics	Dielectric Custom Medical Research team	· Development of treatment method for drug-resistant cancers – Identification of drug resistance-related genes using genome-wide RNAi screening – Identification of mechanism of drug resistance – Based on genomic big-data & resistance mechanisms, development of treatment method for drug-resistant cancers · Development of incurable cancer treatment based on tumor heterogeneity analysis – Analysis of sinlge cell transcriptome and epigenome in gastric cancer – Development of biomarkers for the treatment and prediction through the analysis of cell heterogeneity in incurable gastric cancer
2	Biosicence	Functional Genomics	Rare Intractable Disease Research Center	· **Development of platform technology for precision medicine of rare neuronal disease or cancer** – Studies of function and mechanism for target related to rare neuronal disease or cancer – Development of treatment technology for rare neuronal disease or cancer
3	Biosicence	Functional Genomics	National Primate Center	· Human and primates specific gene identification and functional analysis using comparative gene analysis – Primates genome, transcriptome, and epigenome analysis using NGS technology – Human and primate specific gene identification & species specific phenotype analysis using comparative analysis · Phenotype analysis of primate disease models using functional genomics technology – Genome, transcriptome, and epigenome analysis using NGS technolog and experimental validation – Experimental primate disease model phenotype analysis using primate gene identification
4	Biosicence	Functional Genomics	Immunotherapy Research Center	· Understanding of cancer progression & development of cancer diagnostics/therapeutics – Functional validation of novel therapeutic targets – Development of molecular-targeted/immunotherapy for the treatment of cancer · Development of regenerative medicine technology based on cutting-edge stem cell technology – Production of functional tissue-specific human somatic cells using somatic cell reprogramming technology – Development of core regenerative medicine technology using reprogrammed human somatic cells · Development of novel immunotherapy technology based on cutting-edge stem cell technology – Generation of functional human immune cells using stem cell differentiation/de-differentiation technology – Development of platform technology for regenerative medicine using differentiated/de-differentiated immune cells

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5	Biosicence	Functional Genomics	Stem Cell Convergence Research Center	· Stem cell & Organoids Technology – Development of stem cell-derived hepatic organoids – Organoid-based development of in vivo mimic 3D liver disease models – Organoid-based development of personalized platform for drug discovery – Development of multi-organoids system · Development of 3D Organ type cell structure for drug validation – Generation of In vivo mimicking 3D tumouroids – Development of Bio electro-physiological assay · Development of gene therapy for the rare disease – Target identification and validation of therapeutic gene – Generation of viral vectors for therapeutics – Validation of virus vector in bio-mimicking system · Mechanistic analysis of reprogramming and development of stem cell applications – Mechanistic analysis of pluripotent factor-mediated reprogramming – Development of various applications of stem cells. · Identification of mediator that links cell cycle progression with organ size control and its pathophysiological study – Studies on Hippo signaling and major transcription factors which the main mechanism of tissue size regulation – Mediator studies linking cell cycle to Hippo signaling – Study of tissue size using animal model – Target validation of mediating proteins for theragnosis – Developing the peptide drug based on 3D cell culture system
6	Biosicence	Functional Genomics	Plant System Engineering Research Center	· Molecular mechanisms on plant wound responses – How plants recognize wound? – Molecular signals on shoot/root regeneration at wound sites – Studies on plant regeneration and herbivore defence mechanisms focusing on wound responses · Molecular mechanisms on plant touch responses – How plants recognize touch stimuli provided by wind, insects or obstacles? – Identification of genes involved in touch sensing using touch-sensitive plants including Venus flytrap – Control of plant adaptation to changing environment by engineering touch responses · Potato tuberization under climate change – Signaling pathways on potato tuberization at high temperature – Molecular mechanisms on light-regulated tuberization – Development of potato adapted to climate change

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7	Biosicence	Proteome Structural Biology	Disease Target Structure Research Center / Drug-Based New Drug Development and Nanopore Sensor Team	- Structure-based drug development - Structural biology of disease target proteins and nucleic acids using NMR spectroscopy - Development of nanopore technology for single-molecule sensing of biomolecules Protein design and engineering based on BT-IT-NT convergence - Development of next-generation diagnosis and drug screening platform technologies using nanopore sensors
8	Biosicence	Proteome Structural Biology	Disease Target Structure Research Center / Structural Biology Team	· Structural/functional study on CRISPR/Cas system and its application - Function & application of Type III CRISPR system - Development of a novel gene editing technology · Characterization of Disease target proteins and its application - Functional study of DNA binding protein and its application - Structure based protein engineering for modulation of function
9	Biosicence	Proteome Structural Biology	Infectious Disease Research Center	· Development of various vaccines and diagnostic technologies for control of zoonosis. - Development of various vaccines based on recombinant technologies. - Development of immunological diagnosis technologies - Development of molecular diagnosis technologies · Characteristic analysis of zoonosis - Virus isolation and genetic characterization - Analysis of host factor and mechanism - Characterization of viruses using model animals.

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10	Biotechnology	Nanobiotechnology	Nano Bio Center	· Bionanomaterials - Development of fluorescent materials responsive to biomarkers - Development of bio-nano composites for diagnosis and treatment of diseases - Antibody development and engineering for disease specific diagnostic and therapy · Biosensor/Chip - Development of bioreceptor-based high sensitive and selective biosensor/chip - Development of nano & optics-based platform for detection/diagnosis - Development of diagnostic platform using nucleic acid and signal amplification technology for highly sensitive detection - Development of Point of Care detection and diagnostic kit for diseases · Nanotoxicity - Study on biological effect of nanomaterials such as particular matter, nanoplastics and development of control technology
11	Biotechnology	Bioprocess Engineering	Bio Commercialization (Bio Chemical Team)	· Microbial engineering and process development - Microbial engineering for biomaterial production - Microbial fermentation and scale-up research - Separation and purification technology - Analytical technology for biomaterial
12	Biotechnology	Bioprocess Engineering	Bio commercialization (Biopharmaceutical team)	· Advance technology for biopharmaceutical production - High-level expression vector for mAb production - Suspension-adapted single clone selection - Media optimization for mAb or virus production - Mammalian cell-based biopharmaceutical production - Chromatographic purification - Analytic technology for in-process control
13	Biotechnology	Bioprocess Engineering	Bio New Drug Intermediation Research Center (Protein production team)	· Platform technology for serum-free suspension mammalian cell culture-based protein production system - Process development for therapeutic protein. - Process development for diagnostic antibody - Process development for viral vaccine-producing mammalian cells based on serum-free suspension culture.
14	Biotechnology	Bioprocess Engineering	Biological Resource Center	· Screening and development of useful microbial resources - Excavation of bioconversion enzyme - Polyphasic characterization of new taxon of microorganisms - Research on medical microorganisms by securing symbiotic microorganisms such as human, livestock and insects - Genome analysis for genetic characterization of antibiotics, anticancer substances, etc

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15	Biotechnology	Biosystems and Bioengineering	Synthetic Biology Research Team / Bio Synthesis Team	· Synthetic Biology – Genetic circuit for bio-parts development – CRISPR-guided control of microbes – Machine learning / AI for bio-parts development – Genetic circuit design and debugging – Large-scale metagenome analysis · Microbial genome engineering – *in silico* microbial genome design – Genome engineering of gut microorganisms – Artificial genome synthesis – Fermentation for synthetic pathway
16	Biotechnology	Biosystems and Bioengineering	Synthetic Biology Research Team / Yeast Team	· Yeast genome engineering and production of useful materials – development of protein secretion system in yeast – Study on novel acid-tolerant yeasts – Mass production of bio-based chemicals – production of biologics · Development of bioenergy/biorefinery technology – Production of organic acids using yeast – carbon dioxide reduction enzyme engineering – Consolidated bioprocessing for lignocellulose – Genome engineering of *E. coli, P. putida,* and yeasts
17	Biotechnology	Biosystems and Bioengineering	Microbial Function Research Center	· Glycans and their interaction with human gut microbiome – Evaluation of glycoconjugates and glycan-binding proteins for microbe-host interactions – Development of analytical technologies for glycans in bacterial interaction with the host · Microbial glycobiology and glycobiotechnology – Development of glycoconjugates for prebiotics and bioactive compounds – Development of novel glycoengineering tools
18	Biotechnology	Biosystems and Bioengineering	Plant System Engineering / Plant immunity	· Interaction between plants and endophytic bacteria – Isolation of endophytic bacteria involved in disease resistance in plants – Study on the biocontrol mechanism of endophytic bacteria · Interaction between plants and human enteropathogenic bacteria – Comparative studies of the virulence of type III effector proteins in plant and animal hosts – Differences in host protein and control mechanisms of plant and animal by pathogenic proteins
19	Biotechnology	Biosystems and Bioengineering	Environmental Disease Research Center / Molecular Cell Biotechnology Research Team	· Cell remodeling and application – Biomolecule metabolic pathway remodeling by using molecular cell biology and genome engineering technology – Development of immunity strengthening technology based on remodeling of immune/stem cells

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20	Biotechnology	Environmental Biotechnology	Microalgae Research Team	· **Development of microalgal cell factory** – Development of high oil producing-microalgae by genomic research – Metabolic engineering of microalgal cell for the production of pharmaceutical protein and useful metabolites – Development of large scale production system for microalgae (photo-bioreactor) · **Harmful Algal Blooms (HABs) research** – Studies on biological mechanism of HABs formation and its control – Network analysis of interactions between harmful phytoplankton and microbes
21	Biotechnology	Environmental Biotechnology	Plant Research Team	· **Plant environmental biotechnology for the global sustainable development** – Key technology on plant biotechnology to contribute to the UN SDGs (Sustainable Development Goals, 2015~2030) – Plant environmental biotechnology to contribute to the UN three environmental conventions (Biodiversity, Climate change, Combating desertification) · **Production of sweetpotato-based global food resources and bioresources** – Sweetpotato biotechnology on marginal lands (dry, salty and contaminated soils) in northeast and central Asia. – Production of high-value added components including carotenoids as well as coping with climate change
22	Biotechnology	Environmental Biotechnology	Microbial Research Team	· **Gut microbiome and microbiological ecology** – Screening, isolation, cultivation, identification and preserviation of anaerobes from gut microbiome – Microbial community analysis from various environments – Screening of novel species and taxonomic research – Analysis of microbial genome