Dept. of Bio & Fermentation Convergence Technology

Bio and fermentation technology generally deals with the production of functional biomaterials by mass cell culture and thus is related to many disciplines. It is one of main subjects of green industry which is recently gaining much attention as a driving force for the future. Although some courses of bio and fermentation technology have been offered by many related departments, they are supporting general subjects of the main discipline of the department. The Department of Bio and Fermentation Convergence Technology at Kookmin University is unique in offering the program that focuses on every aspect of bio and fermentation technology. The program is organized multidisciplinary and covers not only biological sciences but also engineering, design and human sciences. Specific area include bio- and medicinal-material technology, microbial fermentation technology, food biotechnology, bioenergy engineering, cold preservation technology, systems biology and advanced physiology. The Department has exchanging and collaborative education and research programs with the Robert Mondavi Institue for Wine and Food Science (RMI) at University of California at Davis (UCD) and Korea Research Institute of Bioscience and Biotechnology (KRIBB).

☐ Courses

❑ Bio and Fermentation Convergence Technology Major Courses

- **Advanced Biochemistry (3)**

  This subject studies the bio-chemical process in living organisms. It deals with the structure and function of cellular components and metabolism such as bio-molecules, amino acids, peptides, proteins, carbohydrates, lipids, and nucleic acids.

- **Advanced Biotechnology (3)**

  This course covers the recent research trend and technology in the area of bio informatics, gene cloning, construction of genetically modified microorganisms, production of recombinant enzymes in microbial systems and kinetic analysis of recombinant enzymes.

- **Seminar in Fermentation Fusion Science and Technology I (3)**

  Students will not only learn the current issues in bio and fermentation convergence technology but also have an opportunity to practice how to give a scientific talk. The focus will be on the review of journal articles, technical reports, and historical science references concerning bio and fermentation convergence technology.

· **Seminar in Fermentation Fusion Science and Technology II (3)**

This is the continued course of Seminar in bio and fermentation convergence technology I. However, this differ from I by requiring students's oral presentation of their own research.

· **Advanced Immunology (3)**

Studies and discuss on the current research trend in cells and biomecules that constitute an immune system and their physiological function, and in the development of new immune materials and vaccine.

· **Advanced Fermentation Process Engineering (3)**

This course introduces recent technology in fermentation process design including various downstream processes. Especially, separation of fermentation products, purification and commercial product manufacturing will be taught.

· **Advanced Bioenergy Engineering (3)**

This course presents the principles of biomass composition and structures, and various advanced technology for conversion of natural biomass to fermentable sugars and then bioenergy. Especially, new technology including microbial fermentation and enzymatic bioconversion technology for bio-ethanol and bio-diesel production will be taught and discussed.

· **Studies on Fungi (3)**

Studies and discuss on the current research trend in physiology, metabolism, genetics, and industrial application of fungi.

· **Special Topics in Metabolic Engineering (3)**

Studies on the basic principles and applications of metabolic engineering for efficient production of value-added biochemicals by modulation of metabolic pathways.

· **Current Topics in Bio Medicinal Materials (3)**

Studies and discuss on the current research trend in pharmaceutical and medical applications.

· **Special Topics in Medicinal Biotechnology (3)**

This lecture covers the state-of-art of the development, evaluation and mass production of new medicinal materials through in-depth understanding of human diseases.

· **Advanced Physiology (3)**

Homeostasis refers to stability, balance or equilibrium. It is the body's attempt to maintain the stability of the human body's internal environment in response

to changes in external conditions. Nervous System, Endocrine System, Cardiovascular System, Digestive System, Respiratory System and Circulatory System will be studied.

· **Advanced Systems Biology (3)**

Inter-disciplinary field of study that focuses on complex interactions within biological systems, using a more holistic perspective approach to biological and biomedical research.

· **Advanced Molecular Biology (3)**

Studies and discuss on the current research trend in replication, transcription, translation, gene expression, regulation, chromatin structure at molecular level.

· **Advanced Cell Biology (3)**

Studies and discuss on the current research trend in cell structure, organell function, cellular signaltransduction, and tumorigenesis at molecular level.

· **Advanced Neuroscience (3)**

The nervous system -the brain, spinal cord, and nerves of the body-is crucial for life and enables you to sense, move, and think. General knowledge in neurobiology, sensory and motor systems, the brain and behavior, and the cellular and molecular basis of learning and memory will be studied.

· **Research in Fermentation Convergence Technology (3)**

Researches by convergence of fermentation technology and emerging biotechnology.

· **Research in Bioconvergence Technology (3)**

Researches by convergence of bioscience and various new technology.

· **Research in Bioengineering (3)**

Researches by combination of biotechnoloy and engineering concept.

· **Advanced microbiology (3)**

Studies and discuss on the current research trend in the nutrition, growth, metabolism, physiology, molecular genetics, genomes of diverse microorganisms.

· **Special topics in functional food and biomedicinal materials (3)**

This course analyzes the cases of technology convergence principles and technology convergence products in BT, IT, NT, and CT fields, and implements individualized health management with the aim of managing chronic diseases and geriatric diseases by accelerating aging. The goal is to utilize the technology to create innovative ideas through the understanding of technology convergence.

· **Business model for functional food and biomedicinal materials (3)**

The aim is to educate creative professionals by exploring market opportunities through education of business model's start-up manual and increasing the efficiency of operation by continuous quality control.

· **SMILE: Smart Merging Interlab Education (3)**

Based on the integrated collaborative research environment, we intend to run Smart Merging InterLab Education (SMILE) program to cultivate biomedical human resources by cultivating integrated knowledge of biomedical medicine through organic linkage of knowledge and technology between labs.

· **Current Topics in Enzymology (3)**

This subject studies general properties of enzyme reactions such as enzyme activity, substrate specificity, and enzyme catalysis.

· **Current Topics in Bio New Technology (3)**

This subject studies the development of bio new materials from GRAS resources for industrial applications.

· **Current Topics in Bio and Medicinal New Materials (3)**

Studies and discuss on the current research trend in pharmaceutical and medical applications.

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