

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 Institute 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)**

Course on the scientific writing and presentation for research management, thesis and paper

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

Course on the scientific writing and presentation for research management, thesis and paper

- **Advanced Immunology (3)**

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

- **Current Topics in Bioprocess Engineering (3)**

Course on the industrialization technology of biological materials including fermentation and purification and bioprocess

- **Advanced Bioenergy Engineering (3)**

Course on the basics and application of bio-energy. It pursues the understanding of various bio-energetical understanding for sustainable economy

- **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)**

Advanced course on the understanding, manufacturing, and regulation for biological drug candidates. It also includes industrialization of biological drug candidates

- **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, organelle function, cellular signal transduction, 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 Eco-Biomaterial Development (3)**
Course on the identification, development, analysis, and application of materials from organisms
- **Research in Eco-Biomaterial Production (3)**
Course on the mass production of biological materials including recombinant technology, gene analysis, development of production strain, purification of product and hybrid technologies
- **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 Biomedical Materials for Eco-Bio (3)**
Course on the hybrid technology including biosensor, diagnosis technology, U-healthcare system for human health care
- **Business model for Eco-Biomaterials (3)**
Course on the establishment and operation of bio-business including biological technology management, accounting and marketing
- **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 Advanced Bionanomaterials (3)**

Course on the industrialization of bionano materials including their current progress, application and industrialization

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

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

- **Current Topics in Eco-Biomaterial Fusion Research I (SMILE-MAX) (3)**

Course of interdisciplinary research theme learning food material, medicinal lead compounds, and their development

- **Current Topics in GMP and Instrumental Analysis (3)**

Course on the understanding the concept of GMP and analysis of biological materials produced by GMP process. It also introduces the current technology and their principles

- **Current Topics in Industrial Practice (3)**

Course on the practical research duties including statistical analysis, patent writing, SOP writing, and experimental design

- **Current Topics in Eco-Biomaterial Fusion Research II (SMILE-MAX) (3)**

Course of interdisciplinary research theme learning food material, medicinal lead compounds, and their development

- **Big data and Artificial Intelligence (3)**

Course on the collection and analysis of biological bigdata as well as the utilization as input data for machine learning

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