The Department of Food Science and Biotechnology Course Catalog (Undergraduate)

Code	Course	Type	Category	Credit	Description
FBT2009	Food Engineering	Theoretical Study	Major	3	Fundamentals of heat transfer, fluid flow, evaporation, drying & other unit operation in the food process industries.
FBT2011	Food Microbiology	Theoretical Study	Major	3	The subject is consist of the criteria of food microorganisms, bacterial distribution in foods, function of food microbiology, improvement of bacterial metabolism, putrefaction by pathogenic bacterials, bacteria count methods, isolation and identification methods
FBT2012	Experiments of Food Microbiology	Laboratory Course	Major	2	The subject is consist of handling methods of food microorganisms and isolation of bacteria, yeast, fungi, etc. The subject try to support improvement of food bacterial function, bacterial count methods, and identification methods.
FBT2015	Food Biotechnology	Theoretical Study	Major	3	This course provides an introduction to the current ststes of bioengineering for foods. This course provides an introduction to the current ststes of bioengineering for foods.
FBT2016	Food Hygiene	Theoretical Study	Major	3	General principle of food hygiene, official methods for food inspection and analysis, saprophytic microorganism, food bone disease, pathogenic bacteria, enterotoccins in foods, bacterial contamination of food ingredients, parasites, hygienic topics on animal products and fishes, environmental contamination, food poisoning by bacteria and others, food-additives, antibiotics and reidues in foods, HACCP in foods and feeds, CGMP in cosmetic plants.
FBT2020	Organic Chemistry	Theoretical Study	Major	3	Application of biologically active substances to the health foods. Application of biologically active substances to the health foods.
FBT2024	Nutritional Physiology	Theoretical Study	Major	3	A critical review and evaluation of certain aspects of animal nutrition and physiology with emphasis on techniques and procedures currently employed in research for animals. The physiology and microbiology of digestion in the animal and biochemical pathways utilization of the absorbed nutrients for productive purposes.
FBT2027	Food Processing 1	Theoretical Study	Major	3	Main objective of the course is to understand principles and procedures of commercial food processes. Physical, chemical, and nutritional changes during food processing will be introduces. Commercial food processing using plant materials, such as grain, soy, and vegetable, as raw materials will be emphasized.
FBT2029	General Microbiology	Theoretical Study	Major	3	Overall goal of the course is to understand structure, function, growth, and physiology of microorganism. Also, foundation for biotechnological applications of microorganism will be introduced.
FBT2031	Food biochemistry 1	Theoretical Study	Major	3	The major nutrients found in foods are proteins, carbohydrates, lipids, and nucleic acids. These four macromolecules are also major constituents of living organisms. Basic structure and characteristics of these four macromolecules will be discussed in this course. Based on these knowledges, the thermodynamics of biochemical reactions and catalyzing enzyme kinetics will also be lectured. This courses offers basic biochemistry required for students in the department of food science and biotechnology.

FBT2032	Food biochemistry	Theoretical Study	Major	3	The major nutrients found in foods are proteins, carbohydrates, lipids, and nucleic acids. These four macromolecules are also major constituents of living organisms. Following basic structure and characteristics of these four macromolecules discussed in food biochemistry1, this course will cover biochemical events and physiological events, relates to metabolic pathways of four major macromolecules and energy production. The contents in this course and food biochemistry1 are tied together to offer students with the complete picture of biochemistry that regulate synthesis and breakdown of carbohydrates, lipids, amino acids, and nucleic acids.
FBT2034	Food Engineering and Preservation Laboratory	Laboratory Course	Major	2	This course is the laboratory associated with FBT classes (Food Engineering and Food Preservation). The laboratory follows the lecture material from FBT2009 and FBT3048 to some degree and attempts to demonstrate and amplify these lecture materials. It also provides laboratory experience and applications in various food systems.
FBT2035	Food Physical Chemistry	Theoretical Study	Major	3	Food physical chemistry can provide basic theory of physical chemistry applied to food science. Physical chemistry is the study of macroscopic, atomic, subatomic, and particulate phenomena in chemical systems in terms of physical laws and concepts. It applies the principles, practices and concepts of physics such as motion, energy, force, time, thermodynamics, quantum chemistry, statistical mechanics and dynamics. This course will provide the underlined knowledge on the motions of moistures in foods, physical characteristics of colloids, gels and sols, and emulsions based on physical chemistry.
FBT2036	Introduction to Food Science and Technology	Theoretical Study	Major	3	This course is designed to provide basic knowledges to the students majored in Food Science and Biotechnology. This courses is primarily focusing the areas in Food Chemistry, Food Engineering, Food preservation, Food microbiology, Food Biochemistry, and Functional foods. In Particular, this course offers broad introduction to the students in the department of food science and biotechnology. Based on this knowledge, current issues on food science and biotechnology are also discussed.
FBT2037	Food biochemistry and molecular biology Laboratory	Laboratory Course	Major	2	This course is designed to provide hands-on experience with techniques and concepts common to food biochemistry and molecular biology. This will be achieved by manual reading, observation, data analysis, and laboratory experiences followed by completion of laboratory reports. This course will also provide recently developed laboratory techniques and their applications into food biochemistry and molecular biology.
FBT3004	Biofunctional Food	Theoretical Study	Major	3	Generally, functional food can be defined as any food that has a positive impact on an individual`s health, physical performance or state of mind in addition to its nutritive values students will be introduced to the biological activity & manufacturing method of the functional foods.
FBT3011	Molecular Biology	Theoretical Study	Major	3	Origin of cell, ovreview of cells and cell research, cell evolution and metabolism, cell biochemistry, biological catalyst of enzyme, metabolic energy, biosynthesis of cell constituents, structure of chromosomes, structure of gene and DNA, replication and repair of DNA, expression of genetic information, recombinant DNA, function of gene, biosynthesis of RNA, cell structure and function, cell regulation, normal cell and cancer cell.

FBT3016	Food Marketing	Theoretical Study	Major	3	Outlines of scientific technology in food distribution, such as ensuring safety of food products and preserving nutritional component during the distribution periods. Instruction of distribution industry, analysis of market, marketing, and sales technigue.
FBT3017	Food Immunology	Theoretical Study	Major	3	Outlines of food immunology and immuno modulate factor in food. Outlines of food immunology and immuno modulate factor in food.
FBT3018	Special Topics in Food Additives	Theoretical Study	Major	3	This subject teaches about the functions and directions for use of natural or synthetic additives such as antioxidants, preservatives, coloring matters, color developers, flovoring agents, seasonings, dietary supplements, and administrative laws and regulations of those additives.
FBT3019	Food Chemistry	Theoretical Study	Major	3	The chemical properties of food proteins, carbohydrates, lipids, vitimains & enzymes, & interactions that occur during processing & storage.
FBT3020	Laboratory for Food Chemistry	Laboratory Course	Major	2	Laboratory experiments are dealing with general analytical and instrumental techniques to the analyses of food constituents.
FBT3023	Human Nutrition	Theoretical Study	Major	3	Basic principles od human nutrition with emphasis on biochemical function and role of nutrients on optimal health ststus-theory of chemical and animal physical factors that influence the quality of foods and animal products-and factors affecting nutrient requirments and deficiencies related to specific stages of the human life cycle.
FBT3024	Natural Products Chemistry	Theoretical Study	Major	3	This lecture deals with the important recent advances in the field of natural products chemistry for food. Emphasis will be on the recent identified natural products having interesting biochemical activities.
FBT3041	Microbial Metabolic Engineering	Theoretical Study	Major	3	This course aims understanding concept of metabolic engineering and its application into biotechnology. Stategies of strain improvement, microbial metabolism related whith value-added products, and microbial fermentation processes will be discussed.
FBT3044	Food Processing II	Theoretical Study	Major	3	Main objective of the course is to understand principles and procedures of commercial food processes. Physical, chemical, and nutritional changes food processing wil be introduced. Especially, commercial food processing using animal tissues, such as meat, fish, milk, and egg, as raw materials will be enphasized.
FBT3045	Food Processing Laboratory	Laboratory Course	Major	1	Main objective of the laboratory course is to understand principles of commercial food processes through practicing procedures.
FBT3046	Food Process Engineering	Theoretical Study	Major	3	Main goal of the course is to understand how engineering principles are applied into food processing systems. Transport processes and unit operations (evaporation, drying, extraction, distillation, membrane separation) related with food processes will be discussed.
FBT3048	Food Storaging	Theoretical Study	Major	3	This subject teaches about introduction of food preservation and heat transfer, estimation of shelf-life of foods, change of food components during storage and food preservation methods by heat treatment, gamma radiation, freezing, concentration, drying, freezed dehydration and vacuum or modified atmosphere packaging

FBT3049	Food Packaging	Theoretical Study	Major	3	This subject teaches about introduction of food introduction to food packaging, structure and related properties of plastic polymers, packaging materials(paper, glass, polymers), printing processes, deteriorative reactions in foods, shelf life of foods, aseptic packaging, packaging methods of foods(microwavable, flesh, horticultural products, dairy products, cereals, snack, confectionary, beverages, safety and legislative aspects of packaging, and food packaging and the environment.
FBT3051	Nutrigenomics	Theoretical Study	Major	3	Main obejctive of the course is to learn emerging nutrigenomics science which encompasses genomics, transcriptomics, proteomics and metabolomics in order to understand the relationship between nutrition/food and health. As such, systematic/integrative approaches for dissecting complex interactions at the molecular level among genes, proteins, metabolites, nutrition/food will be discussed.
FBT3054	Food Science and Biotechnology industrial training 1A	Field Education	Major	2	Studetsenrolledinthesubjectmustcompleteindustrialtraining. Studentesarestronglyencouragedtocompleteasmuchindystirial exprienceaspossible.
FBT3055	Food Science and Biotechnology industrial training 1B	Field Education	Major	2	Studets enroolled in the subject must complete industrial training. Studentes are strongly encouraged to complete as much indystirial exprience as possible.
FBT3056	Food Science and Biotechnology industrial training 2A	Field Education	Major	3	Studets enroolled in the subject must complete industrial training. Studentes are strongly encouraged to complete as much indystirial exprience as possible.
FBT3057	Food Science and Biotechnology industrial training 2B	Field Education	Major	3	Studets enroolled in the subject must complete industrial training. Studentes are strongly encouraged to complete as much indystirial exprience as possible.
FBT3058	Food Science and Biotechnology industrial training 3A	Field Education	Major	4	Studets enroolled in the subject must complete industrial training. Studentes are strongly encouraged to complete as much indystirial exprience as possible.
FBT3059	Food Science and Biotechnology industrial training 3B	Field Education	Major	4	Studets enroolled in the subject must complete industrial training. Studentes are strongly encouraged to complete as much indystirial exprience as possible.
FBT3060	Food Science and Biotechnology industrial training 4A	Field Education	Major	5	Studets enroolled in the subject must complete industrial training. Studentes are strongly encouraged to complete as much indystirial exprience as possible.
FBT3061	Food Science and Biotechnology industrial training 4B	Field Education	Major	5	Studets enroolled in the subject must complete industrial training. Studentes are strongly encouraged to complete as much indystirial exprience as possible.
FBT3062	Food Science and Biotechnology industrial training 5A	Field Education	Major	6	Studets enroolled in the subject must complerte minmum df6 months industrial training. Studentes are strongly encouraged to complete as much indystirial exprience as possible
FBT3063	Food Science and Biotechnology industrial training 5B	Field Education	Major	6	Studets enroolled in the subject must complerte minmum df6 months industrial training. Studentes are strongly encouraged to complete as much indystirial exprience as possible

FBT3064	Food Science and Biotechnology industrial training 6A	Field Education	Major	9	Studets enroolled in the subject must complete industrial training. Studentes are strongly encouraged to complete as much indystirial exprience as possible.
FBT3065	Food Science and Biotechnology industrial training 6B	Field Education	Major	9	Studets enroolled in the subject must complete industrial training. Studentes are strongly encouraged to complete as much indystirial exprience as possible.
FBT3066	Cell biotechnology	Theoretical Study	Major	3	This course is primarily focusing on the function and structure of cell and translation into food science. Since the cell is the basic unit of life, its understanding is therefore essential to further understand fundamental cell biology and relationships between human diseases and food science. Understanding the concepts and recent progress as a student in the department of food science and biotechnology will be required.
FBT3067	Food analysis	Theoretical Study	Major	3	Food analysis is one of basic courses for students majoring in food science and biotechnology. Principles of analysis for the food constituents including moisture, lipids, carbohydrates, proteins, vitamins, minerals, colorants, and volatiles will be provides. Basic analytical knowledge including precision and accuracy, validation methods, quantitative and qualitative analysis will be included. Especially, principles of spectrometry, gas chromatography, and liquid chromatography will be provided.
FBT3068	Bio-product development	Theoretical Study	Major	3	Bio-product development deals with how to develop bio-products including foods, pharmeceutical products and cosmetics. This course will provide knowledge of steps for the development including concept developing methods, prototype developing methods and final product development. This course will be composed of lectures and team projects organized by students. The final objective of this course is to launch imaginary and creative bioproducts by students.
FBT3069	Food sensibility	Theoretical Study	Major	3	Food sensibility is a new course, the objectives of which are to provide scientific knowledge on the color, odorant, taste compounds, and volatiles. Physiological reactions of color, odorant, taste compounds, and volatiles with human receptors will be lectured and formation mechanisms of color, odorant, taste compounds, and volatiles from foods will be lectured. Also, study on the sensory evaluation will be included to assess the impacts of color, odorant, taste compounds, and volatiles on consumers' acceptance.
FBT3070	Food Rheology	Theoretical Study	Major	3	Rheology is the study of the manner in which materials respond to applied strain and stress. All materials have rheological properties and the area is relevant in many fields of studies: geology and mining, concrete technology, soil mechanics, plastic processing, plastic processing, polymers and composites, tribology, paint flow, bioengineering, blood, interfacial rheology, structural material, electrorheology, psychorheology, cosmetics, and pressure sensitive adhesion. The focus of this class is food where understanding is critical in optimizing product development efforts, processing methodology, and final product quality. Rheology of Food Products is a significant component of the food processing industry. Detailed knowledge of rheology of ingredients is important for successful process control and systems engineering.

EBM2008	Introduction of Biomedical Engineering	Theoretical Study	Major	3	Biomedical engineering is a field of study that not only analyzes new phenomenons and solves problems by applying theory and method of the traditional engineering to biology and medicine but puts to the clinical treatment. And it applies principle of biosystem and human body system in the field of engineering for the ultimate purpose of providing an overall enhancement of health care. Thus the object of this course is to develop students' capacities to think and study for themselves by providing the basic theory about biomedical engineering and the method to approach to phenomenons scientifically.
EBM2019	Applied Statistics	Theoretical Study	Major	3	Basic concepts of statistical analysis and experimental designs are converted in this course, and basic techniques such as analysis of varience, regression analysis, testing hypothesis and experimental designs are to be discussed.
EBM2024	Introduction of Bio-Mechatronis	Theoretical Study	Major	3	Biomechatronics is a fusion technology including bio, mechanics, electrics and computer engineering. This course is designed for students to give brief view of the disciplinary of Biomechatronics. In the course, lecture will be given for student in the filed of Biomedical engineering and Mechatronics. Biomedical engineering area will cover biomechanics, biomaterials, bio-sensor and bio-electrics/computer. In addition Mechatronics area will cover biosystem, off-load vehicle, computer vision/system and robotis.
GEN2060	Introduction To Genetic Engineering	Theoretical Study	Major	3	IGE works toward introducing students to essential elements of gene manipulation in vitro (gene cloning). It begins with genetic variations in living things regardless of their taxonomic criteria. Bacterial / eukaryotic gene recombination & conversion mechanisms are the first topics to be studied. Facts and findings on gene banks [complementary (c-) and genomic DNA libraries] are covered in detail. The second half of this class includes the application of recombination technology to numerous industries, like medicine, pharming, agriculture, food etc. The scope of new biotechnology and central role of bacterial hosts is discussed. New strategies for gene cloning (vectors for solubilization and/or export expressed proteins, etc.) and polypeptide purification are reviewed in details. Generation of transgenic organisms (pro- & eukaryotes) is being performed in appropriate laboratories for your hands-on experiences in gene manipulation. Genetic medicine dealing with forensic tests, human disease diagnosis, gene therapy, etc. is followed at the end of the class.
GEN3059	Biochemical Engineering	Theoretical Study	Major	3	Rapid overview of relavant microbiology, biochemistry, and moleculary biological process industries such as enzyme technology, fermentation technology and recombinant cell cultivat technology. Design and analysis of biological reactors and bioseparation processes by integrating biological properties and basic engineering principles. Measurement, data anlysis, control and scale-up for bioreaction and biosepa-ration precesses.

GEN3084	Anatomy and physiology	Theoretical Study	Major	3	A comprehensive introduction to the anatomical structures, physiological functions and biochemical mechanism of actions for each cells, tissues, organs and organ system. The course will concentrate on basic mechanisms underlying human life processes, including cells and membranes; nerve and muscle function; cardiovascular, respiratory, renal, and gastrointestinal physiology; metabolism, endocrinology, and reproduction.
BIT4002	Advanced Measurement and Instrumentation	Theoretical Study	Major	3	The course provides a study of operating principles and characteristics of basic components for various measurement systems to design a data acquistion system for bioproduction. The course investigates components and operating principles of instrumentation, error analysis, measuring system response and calibration of measurement system, and treatment of uncertainties. Method to measure mechanical physical, and biochemical characteristics of agricultural products will also be covered.
BIT4003	Advanced Bio-Production Machinery	Theoretical Study	Major	3	Deals with the functional requirements and principles of operations for the basic types of field machines. Topics includes research and develdpment in farm machinary, soil tillage and dynamics, hydraulic power transmission and implement, crop planting, spraying and dusting, grain and seed harvesting, root crop harvesting.
BIT4007	Advanced Molecular Biology	Theoretical Study	Major	3	Structure and function of chromosome, properties of plamids, gene structure, genetic code and genetic engineering, gene replication, gene exchange, gene cloning, utilization of useful genes into plants and animals, human genome projects, etc.
BIT4008	Advanced Food Biochemisty	Theoretical Study	Major	3	Study of biochemical and functional properties of food components in relation to their roles as parts of complex biochemical systems.
BIT4009	Functional Food Processing	Theoretical Study	Major	3	Principles of manufacturing various functional foods and functional food sttuffs.
BIT4010	Advanced Biotechnoloy for Animal Production	Theoretical Study	Major	3	Biotechnology is advancing rapidly opening new horizons for livestock production and much has already achieved. This course is designed for studying the role of biotechnology in animal nutrition, physiology, animal health, reproduction and genetics for 21
BIT4011	Food Analysis	Theoretical Study	Major	3	Application and development of quantitative technigues to the determination of composition and quality of food products
BIT4012	Advanced Food Manufacturing	Theoretical Study	Major	3	This subject teaches about food manufacture including the selection of raw materials, the manufacturing procedures, and the quality control during distribution periods for the traditional foods such as soy sause, red pepper sauce or soybean sauce, the pro
BIT4015	Advanced Applied Microbiology	Theoretical Study	Major	3	Application of microorganisms, classification of soil microorganisms, properties and utilization of food microorganisms, probiotics for human and animals, environmental microorganisms, medical and medicine of microbiology, anaerobic bacteria, distribution
BIT4016	Advanced Genetics	Theoretical Study	Major	3	this subject deals with general genetic phenomena such as the chromosome structure, gene expression, DNA replication, mutation, chromosomal aberration, and evolution.
BIT4017	Advanced Bioresources Technology	Theoretical Study	Major	3	Lectures on Introduction to bioresources technology , History of the development of bioresources technology, Generation of genetically modified animals, plants,and microorganisms using the state-of-arts gene manipulation methodologies, Analysis of GMOs at
BIT4018	Advanced Cell Biotechnology	Theoretical Study	Major	3	Advanced topics in the field of cell biology that covers the structures and functions, the interactions between cells, and signal transductions of the cell as a unit of life, and basic and advanced technology to study cell biology and its application. Thi

BIT4020	Advanced Biological Chemistry	Theoretical Study	Major	3	Students present brief reviews on selected topics of biological importance. Discussion is carried out principally by graduate students with recent papers.
BIT4021	Advanced Biochemical Engineering	Theoretical Study	Major	3	The course involve lectures and hands-on work in biochemical engineering together with complementary engineering or bioscience. Course include pilot-scale studies in a research plant with computer-linked fermenters, extensive down-stream processing equipm
BIT4023	Advanced Microbiology	Theoretical Study	Major	3	An in-depth coverage of current concepts in microbiology. Topic areas will include the structure and function of microbial cell, microbial metabolism, microbial fermentation, microbial growth and control, and microbial genetics. The course will consist of
BIT4024	Advanced in Embryology	Theoretical Study	Major	3	This lecture is intended to supplement and enrich courses in developmental biology. It provides means information for advanced students on issues of developmental biology in animal and human. 1. gene cloning of animal and human genes 2. utilgation stem cells 3. Begining a new organism 4. early embryonie development in animal and fuman 5. late embryonie development in animal and fuman 6. An overview of plant development
BIT4026	Advanced Viral Immunology	Theoretical Study	Major	3	Lectures and discussions concerning concepts on the virology. Topics include structure, classification, purification and identification, host-virus interactions, tumor viruses and antiviral agents.
BIT4027	Advanced Immumology in Disease	Theoretical Study	Major	3	Understanding the immune system in normal and diseases, and further studying immunotherapeutic strategies through discussing the most research trend and biotechnology.
BIT4029	Problem Based Learning of Protein Engineering	Theoretical Study	Major	3	In this class, students learn topics related to protein engineering by solving given problem set themselves. Students can raise their trouble-shooting ability. Structure-function relationship of proteins and application to the industry is lectured in this course. Course is composed of lectures including protein production, purification, characterization, structure, kinetics, regulation, modification of its activity, functional mechanism and analysis.
BIT4030	Proteomics	Theoretical Study	Major	3	Proteomics is the qualitative and quantitative comparison of proteomes under different conditions to further unravel biological processes. Related technologies are lectured.
BIT4031	Molecular Cosmetic Dermatology	Theoretical Study	Major	3	Cosmetic dermatology is the practice of developing functional products related to skin and hair. Knowledge and technologies are lectured based on skin structure and physiological function, which can be extended to develop novel cosmoceuticals. In this lecture, cosmetic dermatology is lectured at molecular level.
BIT4032	Special Topic in Material Properties of Food	Theoretical Study	Major	3	This course is an integrated introduction to material properties and characteristics of various food materials such as fruit, vegetable, cereal, dairy, seafood and meat. This course provides an overview of the scientific knowledges, such as biochemical, physical and nutritional properties, of raw materials for their processing, preservation, and distributions. This class mainly delivers lectures including group discussions in each topics.

BIT4034	Advanced immunological disease study	Theoretical Study	Major	3	This class explains theoretic background of immunological disease models and methods to establish proper animal models to study. In particular, setting up the experimental conditions and the production of knock-out mouse will be presented.