

Department of Biotechnology

Master of Science Program in Biotechnology (International Program)

M.S. (Biotechnology)

Plan A Option 1:

Total credits required: minimum 36 credits

(1) Major courses: minimum 5 credits (audit)

- Seminar: 2 credits

01051597 Seminar 1,1

- Major requirements: 3 credits

01051591 Research Methods in Agro-industry Biotechnology 3(2-2-5)

(2) Thesis: minimum 36 credits

01051599 Thesis 1-36

Plan A Option 2:

Total credits required: minimum 36 credits

(1) Major courses: minimum 24 credits

- Seminar: 2 credits

01051597 Seminar 1,1

- Major requirements: 10 credits

01051531 Advance Biochemical Engineering 3(3-0-6)

01051561 Gene Technology 4(2-6-7)

01051591 Research Methods in Agro-industry Biotechnology 3(2-2-5)

- Major electives: minimum 12 credits

Choose graduate elective at least 12 credits from the list below.

01051521 Product Recovery Technology 3(3-0-6)

01051522 Sucrose-chemistry and Technology 3(3-0-6)

01051523 Advanced Starch Technology 3(3-0-6)

01051525 Probiotics and Application in Agro-Industry 3(3-0-6)

01051532 Computer Application for Bioprocess 3(3-0-6)

01051562 Advanced Industrial Fermentation Processes 3(2-3-6)

01051563 Immobilization of Biocatalysts 3(2-3-6)

01051564 Biodegradation and Bioremediation 3(3-0-6)

01051566 Genetic Engineering for Agriculture, Industry and

Environment

01051596 Selected Topic in Biotechnology 1-3

01309598 Special Problems 1-3

(2) Thesis: minimum 12 credits

01051599 Thesis 1-12

Course Description

01051501	Intensive Biotechnology for Graduate Principles of biotechnology, properties and characteristics of microorganisms, industrial application of microorganisms, unit operation in agro-industry and biochemical engineering sciences.	5(5-0-10)
01051521	Product Recovery Technology Separation of cell and biochemical compounds from the cell. Cell disintegration and clarification of the extract. Precipitation, chromatography method, aqueous two phase systems, reverse micelles, liquid membranes, and membrane technology.	3(3-0-6)
01051522	Sucrose-chemistry and Technology Physical and chemical characteristics of sucrose. Substitution of hydroxyl group in the molecule of sucrose. Production of subunits of sucrose alcohol, ester and the products resulted from the binding between metals and sucrose.	3(3-0-6)
01051523	Advanced Starch Technology Kinetics of starch molecule break-down. Process of starch production and chemical reactions in producing various subunits from starch including industrial utilization.	3(3-0-6)
01051525	Probiotics and Application in Agro-Industry Characteristics of probiotic microorganisms. Role of probiotics in gastrointestinal tract and health effects of probiotics. Inhibition properties against pathogen. Production of probiotics and stability. Encapsulation technology. Beneficial effect on human and animal health. Application of probiotic in agro-industry.	3(3-0-6)
01051531	Advance Biochemical Engineering Microbial thermodynamics and interaction. Advanced enzyme kinetics. Characteristic metabolic engineering and design of bioreactors. Transport processes. Measurement and control of fermenters. Mathematical model and simulation of fermentation processes. Tissue engineering. Methods for increasing productivity and cost analysis of fermentation processes. Fermentation economics and business.	3(3-0-6)
01051532	Computer Application for Bioprocess Computer application in bioprocesses. Building of mathematical model for bioprocesses. Problems solving by computer. Computer control applied in production. Cases study.	3(3-0-6)
01051561	Gene Technology Genetic materials and their function. Technology of gene transfer. Cloning technology. Recombinant deoxyribonucleic acid identification techniques. Gene analysis techniques. Gene systems of microorganisms and their manipulation involving in agro-industry.	4(2-6-7)
01051562	Advanced Industrial Fermentation Processes Advanced processes in order to increase the productivity of fermentation products. Combination of novel processes in the field of microbial genetic engineering and chemistry for the production of high value products from the low value raw material.	3(2-3-6)
01051563	Immobilization of Biocatalysts Types of biocatalysts, immobilization processes of biocatalysts. Characteristic and stability of immobilized enzyme and microbial cell. Types of bioreactor and application in agro-industry.	3(2-3-6)

01051564	Biodegradation and Bioremediation	3(3-0-6)
	Principle of biodegradation and bioremediation for biological organic and xenobiotic materials in environment. Mechanisms of biodegradation of lignocellulose, aromatic compound, polymer, organic hazardous materials. Biodegradation improvement by genetic and protein engineering. Bioremediation techniques and case studies.	
	Genetic Engineering for Agriculture, Industry and Environment	3(3-0-6)
01051566	Genetic engineering application to agriculture, industry and environment. Gene design for production control. Fermentation design and product recovery for genetic engineered and fused strain. Quality control of biological products. Gene manipulation of organism for agriculture, industry and environment.	
01051591	Research Methods in Agro-industry Biotechnology	3(2-2-5)
	Principles and research methods in biotechnology in agro-industry problem analysis for research topic identification, data collection for research planning, identification of samples and techniques. Analysis, interpretation and discussion of research result; report writing for presentation and publication.	
01051596	Selected Topic in Biotechnology	1-3
	Selected Topics in biotechnology at the master's degree level. Topics are subject to change each semester.	
01051597	Seminar	1
	Presentation and discussion on current interesting topics in Biotechnology at master's degree level.	
01309598	Special Problems	1-3
	Study and research in biotechnology at the master's degree level and compile into a written report.	
01051599	Thesis	1-36
	Research at the master's degree level and compile into a thesis.	