



DOCTOR OF PHILOSOPHY PROGRAM IN AGRICULTURAL BIOTECHNOLOGY

■ FACULTY OF AGRICULTURE, NATURAL RESOURCES AND ENVIRONMENT

DOCTOR OF PHILOSOPHY PROGRAM IN AGRICULTURAL BIOTECHNOLOGY

Biotechnology is truly the “signature” technology of the 21C. Emerging from the advancements in biology and genetics at the molecular level, biotechnology is an independent field using a multidisciplinary approach in experiments to find novel innovations and methodology applicable in agriculture, medicine, and pharmacy as well as in environmental and agricultural industries. It is, therefore, one of the main fields emphasized by the Royal Thai Government’s national development agenda.

Our full-time faculty members received doctoral degrees from renowned universities at home and abroad, with knowledge and expertise in various branches of Agricultural Biotechnology, from traditional plants, animals, bacteria, and the environment to the more modern ones, such as molecular biology, genetic engineering, and nanotechnology.



Objectives

Our aim is that graduates should be appropriately equipped to take their place in the world as:

- Advanced knowledgeable agricultural biotechnologists
- Systematic thinkers
- Competent researchers with ability to appropriately apply research findings for the benefit of themselves and their organization on a continuous basis.

Admission

In accordance with the Graduate School Rules and Regulations. The program committee reserves the rights to require more qualifications as deemed appropriate.

Medium of Instruction

Thai and English

Research Focus

- DNA Marker Technology
- Recombinant Fermentation
- Metabolic Engineering

Requirement for Graduation

In accordance with the Graduate School Rules and Regulations with one special condition of organizing a seminar every semester and successfully presenting at least one research paper at each seminar throughout the program.



Doctor Of Philosophy Program In Agricultural Biotechnology

- FACULTY OF AGRICULTURE, NATURAL RESOURCES AND ENVIRONMENT

Structure of the Program

1. Credit Requirements. *

Requirements	Option 1.1	Option 1.2	Option 2.1	Option 2.2
Coursework	-	-	12	24
Core Courses	-	-	3	3
Electives	-	-	9	21
Required Non-credit Courses	7	7	7	7
Dissertation	48	72	36	48
Total	48	72	48	72

* Minimum credits required.

2. Core Courses

Requirements	Option 1.1		Option 1.2		Option 2.1		Option 2.2	
	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.
Advanced Biochemistry	-	-	-	-	418512	3	418512	3
Total	0	0	0	0	1	3	1	3

3. Electives

Requirements	Option 1.1		Option 1.2		Option 2.1		Option 2.2	
	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.
Cell Structure and Function	-	-	-	-	-	-	110521	3
Advanced Gene Technology	-	-	-	-	110541	3	110541	3
Applications of Molecular Markers	-	-	-	-	-	-	110542	3
Aspects of Biotechnology	-	-	-	-	-	-	110551	3
Applications of Polysaccharides in Industry	-	-	-	-	-	-	110562	3
Industrial Fermentation Process	-	-	-	-	-	-	110573	3
Biotechnology Quality and Safety Management	-	-	-	-	110581	3	110581	3
Biotechnology Laboratory Instrumentation	-	-	-	-	-	-	110612	2
Metabolic Engineering	-	-	-	-	110641	3	110641	3
Advanced Enzyme Technology	-	-	-	-	110661	3	110661	3
Bioprocess Design	-	-	-	-	110671	3	110671	3
Total	0	0	0	0	5	≥9	11	≥21

4. Required Non-credit Courses.

Requirements	Option 1.1		Option 1.2		Option 2.1		Option 2.2	
	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.
Agricultural Biotechnology Seminar 1	110601	1	110601	1	110601	1	110601	1
Agricultural Biotechnology Seminar 2	110602	1	110602	1	110602	1	110602	1
Agricultural Biotechnology Seminar 3	110603	1	110603	1	110603	1	110603	1
Agricultural Biotechnology Seminar 4	110604	1	110604	1	110604	1	110604	1
Advanced Research Methodology in Biotechnology	110611	3	110611	3	110611	3	110611	3
Total	5	7	5	7	5	7	5	7

5. Dissertation Credit Requirements.

Requirements	Option 1.1		Option 1.2		Option 2.1		Option 2.2	
	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.	Course No.	Cr.
Dissertation 1 Option 1.1	110691	8	-	-	-	-	-	-
Dissertation 2 Option 1.1	110692	8	-	-	-	-	-	-
Dissertation 3 Option 1.1	110693	8	-	-	-	-	-	-
Dissertation 4 Option 1.1	110694	8	-	-	-	-	-	-
Dissertation 5 Option 1.1	110695	8	-	-	-	-	-	-
Dissertation 6 Option 1.1	110696	8	-	-	-	-	-	-
Dissertation 1 Option 1.2	-	-	110697	9	-	-	-	-
Dissertation 2 Option 1.2	-	-	110698	9	-	-	-	-
Dissertation 3 Option 1.2	-	-	110699	9	-	-	-	-
Dissertation 4 Option 1.2	-	-	110791	9	-	-	-	-
Dissertation 5 Option 1.2	-	-	110792	9	-	-	-	-
Dissertation 6 Option 1.2	-	-	110793	9	-	-	-	-
Dissertation 7 Option 1.2	-	-	110794	9	-	-	-	-
Dissertation 8 Option 1.2	-	-	110795	9	-	-	-	-
Dissertation 1 Option 2.1	-	-	-	-	110796	3	-	-
Dissertation 2 Option 2.1	-	-	-	-	110797	6	-	-
Dissertation 3 Option 2.1	-	-	-	-	110798	6	-	-
Dissertation 4 Option 2.1	-	-	-	-	110799	6	-	-
Dissertation 5 Option 2.1	-	-	-	-	110891	6	-	-
Dissertation 6 Option 2.1	-	-	-	-	110892	9	-	-
Dissertation 1 Option 2.2	-	-	-	-	-	-	110893	3
Dissertation 2 Option 2.2	-	-	-	-	-	-	110894	6
Dissertation 3 Option 2.2	-	-	-	-	-	-	110895	6
Dissertation 4 Option 2.2	-	-	-	-	-	-	110896	9
Dissertation 5 Option 2.2	-	-	-	-	-	-	110897	9
Dissertation 6 Option 2.2	-	-	-	-	-	-	110898	9
Dissertation 7 Option 2.2	-	-	-	-	-	-	110899	6
Total	6	48	8	72	6	36	7	48

Course Descriptions

110521 Cell Structure and Function

3(2-3-5)

A study of eukaryotic cells, structural details, and the molecular functions of the different parts of the cell; organelle biosynthesis; and paper review sessions.

110541 Advanced Gene Technology

3(2-3-5)

Study of the following topics: principles and advanced techniques used in recombinant DNA technology, DNA markers, the isolation of genes of interest, recombinant protein production, genetically modified organisms, gene therapy, genomes, and transcriptome and proteome analysis.

110542 Applications of Molecular Markers

3(2-3-5)

Examination of DNA, principles of DNA markers, and DNA marker technologies and their applications in genetics.

110551 Aspect of Biotechnology

3(2-3-5)

Topics studied include: definitions of biotechnology; classical biotechnology; industrial fermentation; and gene technology and its application in agriculture, industry, and medical biotechnology.

110562 Applications of Polysaccharides in Industry

3(2-3-5)

Types of polysaccharides, composition characteristics, classification and synthesis, extraction of polysaccharide both starch and non-starch from biomaterial sources, and functional properties and applications in industries.

110573 Industrial Fermentation Processes

3(2-3-5)

A study of industrial fermentation processes including important factors in fermentation processes, i.e., microorganisms, fermentation media and products, starter culture preparation and preservation; industrial products

from various fermentation processes, i.e., submerge and solid- state fermentation; and recent advances in industrial fermentation processes.

110581 Biotechnology Quality and Safety Management 3(3-0-6)

Examination of a wide variety of quality standards and regulations including the following: International Organisation for Standardisation (ISO) series, Good Manufacturing (GMP), Good Clinical Practice (GCP), Good Laboratory Practice (GLP), Hazard Analysis Critical Control Point (HACCP); other topics include: risk and safety in microbiology, process analysis and validation, quality control of products and their production, international guidance documents, documentation and patent law, laws and regulations about biological products, and safety assessment of products from the genetic modification of organisms.

110601 Agricultural Biotechnology Seminar 1 1(0-2-1)

Searching, analyzing, and criticising national and international scientific publications related to biotechnological approaches; searching for research topics; preparing a thesis proposal; and presenting it by way of an oral examination.

110602 Agricultural Biotechnology Seminar 2 1(0-2-1)

Searching, analyzing, and criticising national and international scientific publications related to agricultural biotechnology in order to learn how to prepare a progress report of the research thesis; and presenting it by way of oral presentation.

110603 Agricultural Biotechnology Seminar 3 1(0-2-1)

Searching, analyzing, and criticising national and international scientific publications related to agricultural biotechnology; and preparing a research publication for oral presentation.

110604 Agricultural Biotechnology Seminar 4**1(0-2-1)**

Searching, analysing, and criticising national and international scientific publications related to agricultural biotechnology; and preparing a research publication for oral presentation.

110611 Advanced Research Methodology in Biology**3(3-0-6)**

A study of the proper techniques of research methodology in science and technology including: meaning and characteristics of research, research goals, types of research, research processes, variables and hypotheses, data collection, proposal and research writing, research evaluation and application, and research ethics.

110612 Biotechnology Laboratory Instrumentation**2(1-3-3)**

The principle and theories of biotechnological analysis associated with appropriate instruments, such as spectroscopy, chromatography, and electrophoresis techniques including other novel techniques and advanced instruments for biotechnology laboratories.

110641 Metabolic Engineering**3(3-0-6)**

The application of recombinant DNA methods to re-structure metabolic networks in efforts to enhance production of metabolite and protein products including examination of the latest journal publications.

110661 Advanced Enzyme Technology**3(2-3-5)**

Examination of chemical structures of enzymes, kinetics and mechanisms of enzyme action, industrial enzyme production and control, extraction and purification of enzymes, immobilised enzyme techniques and properties, applications of enzymes in food industries, environment and medical assays, and bioassays.

110671 Bioprocess Design**3(2-3-5)**

Systematic approaches to process design including; the selection of biocatalysts and raw materials, upstream and downstream unit operation, the development of process flow diagrams, process analysis and simulation using software packages, and economic analysis of manufacturing processes.

110691 Dissertation 1, Option 1.1**8Credits**

Conducting an extensive literature review of topics related to the proposed research and preparing a draft research proposal which includes a research topic, the research problem statement, research objectives, justification for the research, and research procedures in brief; and submitting the proposal to the dissertation advisor.

110692 Dissertation 2, Option 1.1**8Credits**

Conducting preliminary research and analysis, preparing and submitting a dissertation proposal comprising details of the research components, nominating a prospective dissertation advisor to the Graduate School, taking a dissertation defense, and submitting a progress report to the dissertation advisor.

110693 Dissertation 3, Option 1.1**8Credits**

Designing and conducting experiments, collecting and analysing data, and submitting a progress report to the dissertation advisor.

110694 Dissertation 4, Option 1.1**8Credits**

Designing and conducting experiments, collecting and analysing data, and submitting a progress report to the dissertation advisor.

110695 Dissertation 5, Option 1.1**8Credits**

Finalising experiments, collecting and analysing data, and preparing and submitting a final progress report to the dissertation advisor.

110696 Dissertation 6, Option 1.1**8Credits**

Preparing a dissertation, taking a final dissertation defense, and making any necessary rectifications or modifications before submitting a completed dissertation to the Graduate School.

110697 Dissertation 1, Option 1.2**9Credits**

Consulting and discussing the proposed research concepts with the dissertation advisor; researching related documents, books, academic journals, and research articles; and preparing and submitting a brief literature review to the dissertation advisor.

110698 Dissertation 2, Option 1.2**9Credits**

Conducting an extensive literature review of topics related to the proposed research and preparing a draft research proposal which includes a research topic, the research problem statement, research objectives, justification for the research, and research procedures in brief; and submitting the proposal to the dissertation advisor.

110699 Dissertation 3, Option 1.2**9Credits**

Preparing and submitting a completed dissertation proposal comprising details of the research components, nominating a prospective dissertation advisor to the graduate school, and taking a dissertation defense.

110791 Dissertation 4, Option 1.2**9Credits**

Conducting preliminary experiments, collecting and analysing data, and submitting a progress report to the dissertation advisor.

110792 Dissertation 5, Option 1.2**9Credits**

Designing and conducting preliminary experiments, collecting and analysing data, and submitting a progress report to the dissertation advisor.

110793 Dissertation 6, Option 1.2**9Credits**

Conducting experiments, collecting and analysing additional data, and submitting a progress report to the dissertation advisor.

110794 Dissertation 7, Option 1.2**9Credits**

Finalising experiments, collecting and analysing data, and preparing and submitting a final progress report to the dissertation advisor.

110795 Dissertation 8, Option 1.2**9Credits**

Preparing a dissertation, taking a final dissertation defense, and making any necessary rectifications or modifications before submitting a completed dissertation to the Graduate School.

110796 Dissertation 1, Option 2.1**3Credits**

Conducting an extensive literature review of topics related to the proposed research; preparing a draft research proposal which includes a research topic, the research problem statement, research objectives, justification for the research, and research procedures in brief; and submitting the proposal to the dissertation advisor.

110797 Dissertation 2, Option 2.1**6Credits**

Preparing and submitting a completed research proposal comprising details of the research components, collecting and analysing data, nominating a prospective dissertation advisor to the Graduate School, taking a dissertation defense, and submitting a progress report to the dissertation advisor.

110798 Dissertation 3, Option 2.1**6Credits**

Preparing and submitting a completed research proposal comprising details of the research components, conducting experiments, collecting and analysing data, nominating a prospective dissertation advisor to the Graduate School, taking a dissertation defense, and submitting a progress report to the dissertation advisor.

110799 Dissertation 4, Option 2.1**6Credits**

Conducting experiments, collecting and analysing additional data, and submitting a progress report to the dissertation advisor.

110891 Dissertation 5, Option 2.1**6Credits**

Finalising experiments, collecting and analysing data, and preparing and submitting a final progress report to the dissertation advisor.

110892 Dissertation 6, Option 2.1**9Credits**

Preparing a dissertation, taking a final dissertation defense, and making any necessary rectifications or modifications before submitting a completed dissertation to the Graduate School.

110893 Dissertation 1, Option 2.2**3Credits**

Consulting and discussing the research concepts with the dissertation advisor; researching related documents, books, academic journals, and research articles; and submitting a brief literature review to the dissertation advisor.

110894 Dissertation 2, Type 2.2**6Credits**

Conduct an extensive literature review of topics related to the proposed research and preparing a draft research proposal which includes a research topic, the research problem statement, research objectives, justification for the research, and research procedures in brief; and submitting the proposal to the dissertation advisor.

110895 Dissertation 3, Option 2.2**6Credits**

Preparing and submitting a completed research proposal comprising details of the research components, nominating a prospective dissertation advisor to the Graduate School, and taking a dissertation defense.

110896 Dissertation 4, Option 2.2**9Credits**

Designing and conducting experiments, collecting and analysing data, and submitting a progress report to the dissertation advisor.

110897 Dissertation 5, Option 2.2**9Credits**

Conducting experiments, collecting and analysing data, and submitting a progress report to the dissertation advisor.

110898 Dissertation 6, Option 2.2**9Credits**

Finalising experiments, collecting and analysing data, and preparing and submitting a final progress report to the dissertation advisor.

110899 Dissertation 7, Option 2.2**6Credits**

Preparing a dissertation, taking a final dissertation defense, and making any necessary rectifications or modifications before submitting a completed dissertation to the Graduate School.

418512 Advanced Biochemistry**3Credits**

A study of current and interesting topics in advanced biochemistry and related fields.