Course Title
Ph.D. in Biotechnology (International Program)

Academic Institution: Faculty of Agro-Industry, Prince of Songkla University

Program Title: Doctor of Philosophy (Biotechnology) or Ph.D. (Biotechnology) (International Program)

Program learning outcome (PLO)

PLO1 Demonstrate a good manner and academic ethics
PLO2 Integrate advanced biotechnology knowledge to generate new knowledge and innovations in food biotechnology, bioenergy, and environmental biotechnology
PLO3 Use information technology for searching the up-to-date technology, innovation, and current global situation
PLO 4 Develop the research to generate new knowledge and innovations in food biotechnology, bioenergy, and environmental biotechnology
PLO 5 Develop the idea for entrepreneurship in biotechnology
PLO 6 Prepare effectively for academic writing and oral communication in English

Philosophy of the Program

This program would provide students with the skills in research to geanerate the new knowledge and innovation in food biotechnology, bioenergy, and environmental biotechnology for the sustainable development of agro-industry in the south of Thailand. This program also employ the progressivism learning with ethics and morality.

PSU's educational philosophy (http://webagro.psu.ac.th)

PSU's educational philosophy is managed by

- Progressivism using learning process with the students as the "center of attention" and the basis of "Outcome Based Education" such as active learning, problem-based learning, project-based learning, service learning
- PSU aims to provide students with a lifelong learning approach
- PSU believes that these principles can be met and aided by Prince of Songkla Mahidon Adulyadej's motto "Our soul is for the benefit of mankind"

Program structure:

Courses	Plan 1 (Research only)		Plan 2 (Research with course works)	
	Plan 1.1	Plan 1.2	Plan 2.1	Plan 2.2
Compulsory	-	-	6	17
Elective	-	-	6	7
Thesis	48	72	36	48
Total	**48**	**72**	**48**	**72**

Note: Plan 1.1 and 2.1 for students who graduated in Master program
Plan 1.2 and 2.2 for students who graduated in Bachelor program

Study plan for Plan 1 (Research only)

Academic year	Semester	Plan 1.1		Plan 1.2	
1	1	853-948 Thesis	8 credits	853-972 Thesis	9 credits
	2	853-948 Thesis	8 credits	853-972 Thesis	9 credits
		*853-696 Seminar 1	1 credits	*853-696 Seminar 1	1 credits
		Total	**16 credits**	**Total**	**18 credits**
2	1	853-948 Thesis	8 credits	853-972 Thesis	9 credits
	2	853-948 Thesis	8 credits	853-972 Thesis	9 credits
		*853-697 Seminar 2	1 credits	*853-697 Seminar 2	1 credits
		Total	**16 credits**	**Total**	**18 credits**
3	1	853-948 Thesis	8 credits	853-972 Thesis	9 credits
	2	853-948 Thesis	8 credits	853-972 Thesis	9 credits
		*853-698 Seminar 3	1 credits	*853-698 Seminar 3	1 credits
		Total	**16 credits**	**Total**	**18 credits**
4	1	-		853-972 Thesis	9 credits
	2	-		853-972 Thesis	9 credits
				*853-699 Seminar 4	1 credits
				Total	**18 credits**
		Total	**48 credits**	**Total**	**72 credits**

Study plan for Plan 2 (Research with course works)

Academic year	Semester	Plan 2.1		Plan 2.2	
1	1	853-691 Special Topics in Biotechnology	1 credits	853-521 Biotechnology	4 credits
		853-xxx Elective course	6 credits	853-524 Res. Techniques in Biotech	3 credits
		853-936 Thesis	3 credits	853-522 Entrepreneurship in Biotech	3 credits
				853-xxx Elective course	3 credits
		Total	**10 credits**	**Total**	**13 credits**
	2	853-621 Adv. Res. Techniques in Biotech	2 credits	853-621 Adv. Res. Techniques in Biotech	2 credits
		853-936 Thesis	6 credits	853-xxx Elective course	4 credits
		853-696 Seminar 1	1 credits	853-948 Thesis	3 credits
				853-696 Seminar 1	1 credits
		Total	**9 credits**	**Total**	**10 credits**
2	1	853-936 Thesis	7 credits	853-691 Special Topics in Biotechnology	1 credits
				853-948 Thesis	8 credits
		Total	**7 credits**	**Total**	**9 credits**
	2	853-697 Seminar 2	1 credits	853-697 Seminar 2	1 credits
		853-936 Thesis	7 credits	853-948 Thesis	8 credits
		Total	**8 credits**	**Total**	**9 credits**
3	1	853-936 Thesis	7 credits	853-691 Special Topics in Biotechnology	1 credits
				853-948 Thesis	8 credits
		Total	**7 credits**	**Total**	**9 credits**
	2	853-698 Seminar 3	1 credits	853-698 Seminar 3	1 credits
		853-936 Thesis	6 credits	853-948 Thesis	8 credits
		Total	**7 credits**	**Total**	**9 credits**
4	1	-		853-948 Thesis	8 credits
		-		**Total**	**8 credits**
	2			853-699 Seminar 4	1 credits
		-		853-948 Thesis	5 credits
		-		**Total**	**6 credits**
		Total	**48 credits**	**Total**	**72 credits**

Elective courses 6-7 credits

853-525 Cell Metabolism	3 (3-0-6) credits
853-531 Enzyme Technology	3 (3-0-6) credits
853-532 Traditional Fermented Foods	3 (3-0-6) credits
853-533 Yeast Technology	3 (3-0-6) credits
853-534 Algal Technology	3 (3-0-6) credits
853-541 Waste Utilization and Treatment in Agro-Industry	3 (3-0-6) credits
853-542 Advanced Environmental Biotechnology	3 (3-0-6) credits
853-543 Biodegradation and Bioremediation	3 (3-0-6) credits
853-544 Agricultural Microorganisms and Applications	3 (3-0-6) credits
853-551 Bioenergy Technology	3 (3-0-6) credits
853-561 Food Biotechnology	3 (3-0-6) credits
853-562 Advanced Food Microbiology	3 (3-0-6) credits
853-571 Genetic Engineering Technology	3 (3-0-6) credits
853-572 Metabolic Engineering	3 (3-0-6) credits
853-573 Molecular Biotechnology	3 (3-0-6) credits
853-581 Advanced Bioprocess Engineering	3 (3-0-6) credits
853-582 Bioreactor Design	3 (3-0-6) credits
853-583 Measurement and Process Control in Agro- and Bioindustry	3 (3-0-6) credits
853-584 Bioprocess Modeling and Control	3 (3-0-6) credits
853-585 Downstream Processing in Biotechnology	3 (3-0-6) credits

Modules for current students, non-degree student (for upskill-reskill and academic credit bank)

853-501 Module in Environmental Biotechnology	6((4)-6-8)
853-502 Module in Industrial Biotechnology	6((4)-6-8)
859-599 Research Methodology	1-3((x)-x-x)
Module 1: Research Methodology- Research as Scientific Approach	1((1)-0-2)
Module 2: Research Methodology-Statistics for Research	1((0)-2-1)
Module 3: Research Methodology-Experimental Design	2((1)-2-3)
853-601 Module in Biotechnology Entrepreneur	6((4)-6-8)
853-602 Module in Biotechnology for Bio-Circular-Green (BCG) economy	6((4)-6-8)
853- 622 Technology and Innovation Management for Bioproducts	3((3)-0-6)
853-631 Advanced Enzyme Technology	3((3)-0-6)
853-632 Immobilized Biocatalysts	3((3)-0-6)
853-661 Bioactive Compounds in Foods	3((3)-0-6)
853-662 Microbial Metabolism in Foods	3((3)-0-6)
853-681 Separation and Extraction Process Technology	3((3)-0-6)

Duration: 3-4 years

Graduation Requirements

1. Pass qualifying exam
2. Meet the English performance following the regulation issued by Graduate School
3. Fulfill the program requirements with a GPA of at least 3.00 (except Plan A1)
4. Satisfy the proposal examination and thesis with grade S or X
5. Plan 1 publish the academic article from thesis or a part of thesis in a journal which has a peer review at least 2 articles (ISI, Scopus)
6. Plan 2 publish the academic article from thesis or a part of thesis in a journal or proceeding which has a peer review at least 1 articles (ISI, Scopus)