

Ph.D. Degree

Doctor of Philosophy Program in Functional Food and Nutrition

1. Name of degree and major

Full name: Doctor of Philosophy (Functional Food and Nutrition)

Abbreviation name: Ph.D. (Functional Food and Nutrition)

2. Total credit in the program

Plan 1.1 or 2.1 (thesis only) 48 credits

Plan 1.2 or 2.2 (mixed mode) 72 credits

3. Qualification

Graduation in Bachelor degree or equivalent is required.

Graduation in Master degree or equivalent is required.

3.1 Plan 1 (thesis only)

1) Plan 1.1 is for candidate who graduated Master in Master of Functional Food and Nutrition or Health Science or related major. Average grade point is at least 3.50 or equivalent. In case grade point is lower than 3.50, additional qualification is required.

- Publication in qualified journal or with peer review at least 1 publication or

- Research experience in Science or related major at least 2 years.

2) Plan 1.2 is for candidate who graduated Bachelor in Food Science or Health Science or related major with excellence grade point.

3.2 Plan 2 (Mixed mode)

1) Plan 2.1 is for candidate who graduated in Master of Functional Food and Nutrition, Health Science or related major.

2) Plan 2.2 is for candidate who graduated in Bachelor of Food, Health Science or related major with excellence grade point.

Final decision of acceptance will be duty of curriculum's committee considering from application and interview (if required).

<input type="checkbox"/> Plan 2.1	48	credits
- Compulsory	9	credits
- Elective	3	credits
- Thesis	36	credits

859-501 may required.

<input type="checkbox"/> Plan 2.2	72	credits
- Compulsory	17	credits
- Elective	7	credits
- Thesis	48	credits

859-501 may required.

5. Study plan

For Plan 1

Year	Semester	Graduated Master (Plan 1.1)			Graduated Bachelor (Plan 1.2)		
1	1	859-948	Thesis	8 credits	859-972	Thesis	7 credits
	2	859-948	Thesis	8 credits	859-972	Thesis	9 credits
		*859-696	Seminar I	1 credit	*859-696	Seminar I	1 credit
	Total				16 credits	Total	
2	1	859-948	Thesis	8 credits	859-972	Thesis	10 credits
	2	859-948	Thesis	8 credits	859-972	Thesis	12 credits
		*859-697	Seminar II	1 credit			
	Total				16 credits	Total	
3	1	859-948	Thesis	8 credits	859-972	Thesis	12 credits
	2	859-948	Thesis	8 credits	859-972	Thesis	12 credits
		*859-698	Seminar III	1 credit	*859-697	Seminar II	1 credit
	Total				16 credits	Total	

Year	Semester	Graduated Master (Plan 1.1)	Graduated Bachelor (Plan 1.2)	
4	1	-	859-972 Thesis	5 credits
	2	-	859-972 Thesis	5 credits
			*859-698 Seminar III	1 credit
			Total	10 credits
Minimum total credit		48 credits	Minimum total credit	72 credits

* no. of credit will not be counted.

For Plan 2

Year	Semester	Graduated Master (Plan 2.1)	Graduated Bachelor (Plan 2.2)	
1	1	859-691 Advanced research methodology in functional food and nutrition 3 credits	859-511 Food, nutrition and health	3 credits
	 Elective 3 credits	859-512 Metabolic pathway of nutraceutical and functional food	2 credits
		859-696 Seminar I 1 credit	859-513 Technology and commercialization of nutraceutical and functional food	3 credits
			859-691 Advanced research methodology in functional food and nutrition	3 credits
	 Elective 2 credits		
		Total 7 credits	Total 13 credits	
	2	859-692 Concept of research and development in functional food and nutrition 3 credits	859-692 Concept of research and development in functional food and nutrition	3 credits
		859-936 Thesis 8 credits Elective 3 credits	
		 Elective 2 credits	
			859-696 Seminar I 1 credit	
		Total 11 credits	Total 9 credits	
2	1	859-936 Thesis 9 credits	859-948 Thesis	6 credits
		Total 9 credits	Total 6 credits	
	2	859-697 Seminar II 1 credit	859-948 Thesis	9 credits
		859-936 Thesis 9 credits		
		Total 10 credits	Total 9 credits	

Year	Semester	Graduated Master (Plan 2.1)	Graduated Bachelor (Plan 2.2)
3	1	859-936 Thesis 6 credits	859-948 Thesis 10 credits
		Total 6 credits	Total 10 credits
	2	859-698 Seminar III 1 credits 859-936 Thesis 4 credits	859-697 Seminar II 1 credit 859-948 Thesis 10 credits
		Total 5 credits	Total 11 credits
4	1	-	859-948 Thesis 8 credits
			Total 8 credits
	2	-	859-698 Seminar III 1 credit 859-948 Thesis 5 credits
			Total 6 credits
		Minimum total credit 48 credits	Minimum total credit 72 credits

6. Course description

6.1 Pre-requisite subject

859-501 Principles of Functional Food and Nutrition 2(2-0-4)

Basic of food chemistry and food analytical method; list of food additives allow to be used in food; basic of food microbiology, beneficial microorganisms for health or food industrial microorganisms; physical property and sensory evaluation of food; basic of functional food processing, impact on nutritional value; functional property of nutrient and bioactive compound; regulation of functional food and dietary supplement and nutrition/supplement fact

6.2 Comulsory subject

859-511 Food, Nutrition and Health 3(3-0-6)

Overview of food, nutrition, and health in present lifestyle; nutrition guideline and assessment; human digestion and absorption system; functional properties of macronutrients micronutrients and trace elements; energy balance and body weight regulation; nutritional, exercise, and sport; nutritional application in life cycle; nutritional program designs and use of nutritional equipments

859-512 Nutraceutical and Functional Food in Metabolic Pathway 2(2-0-4)

Principles of metabolic pathway; energy of life and power cellular; regulation of metabolic section; metabolism of nutraceutical, functional food, dietary supplement, phytochemical and dietary fiber; role of nutraceutical on gastrointestinal tract; anti-oxidation and their mechanism of action in oxidative stress and aging process; nutraceutical and functional food on glucose control; central nerve system; cardiovascular

859-513 Technology and Commercialization of Nutraceutical and Functional Food 3(3-0-6)

Role of food industry to nutraceutical and functional food; consumer' behavior for consumption of nutraceutical and functional food; technology of nutraceutical and functional food processing; extraction, separation and purification technology of bioactive compound/ functional food ingredient; encapsulation technology of pharmaceutical product and dietary supplement; technology of capsule and tablet of pharmaceutical product and dietary supplement; shelf life study and sensory evaluation of nutraceutical and functional food; packaging technology; development of product prototype; law and regulation of nutraceutical and functional food; and case study

859-691 Advanced Research Methodology in Functional Food and Nutrition 3(3-0-6)

The objective, rationale of research, research methodology and research ethics; academic review and data collection; and problem solving methods for functional food and nutrition topics; advanced quantitative and qualitative analysis; design of experiments and statistical methods for research; plagiarism check; research planning management, reporting and thesis writing, process of proposal preparation for thesis and funding submission, communication skill and presentation; case study

859-692 Research and Development Concept in Functional Food and Nutrition 3(3-0-6)

Role of marketing and consumer in nutrition and functional food research and development; current research and development in nutrition and functional food; research and development concept in nutrition and functional food emphasize on functional food ingredient; products; technology and packaging; safety; knowledge management for nutraceutical and functional food industry; evaluation of bioactive compound and nutraceutical and functional food product; plant visit or seminar by expert from nutraceutical functional food industry; case study

859-696 Seminar I **1(0-2-1)**

Presentation the up-to-date academic knowledge, information, and research in the functional food and nutrition field; research literature reviews; experimental design and application; final report submitting

859-697 Seminar II **1(0-2-1)**

Presentation and report the progress of ongoing research; research data analysis and interpretation; final report submitting

859-698 Seminar III **1(0-2-1)**

Presentation and report the progress of ongoing research; research data analysis and interpretation; final report submitting

859-936 Thesis **36(0-108-0)**

Study and research for knowledge/innovation or theory-building in the field of functional food and nutrition; quantity and quality of research must be performed accordance with the credits enrolled under supervision of advisory committee; select a topic of interest; writing research background and rationale, objectives, research problems, hypotheses, research plan and methodology; results and discussion, conclusions and recommendation; writing a complete thesis; research progress must be presented each semester

859-948 Thesis **48(0-144-0)**

Study and research indepth for knowledge/innovation or theory-building in the field of functional food and nutrition; quantity and quality of research must be performed accordance with the credits enrolled under supervision of advisory committee; select a topic of interest; writing research background and rationale, objectives, research problems, hypotheses, research plan and methodology, results and discussion, conclusions and recommendation; writing a complete thesis; research progress must be presented each semester

859-972 Thesis**72(0-216-0)**

Study and research wisdom for knowledge/innovation or theory-building in the field of functional food and nutrition; quantity and quality of research must be performed accordance with the credits enrolled under supervision of advisory committee; select a topic of interest; writing research background and rationale, objectives, research problems, hypotheses, research plan and methodology, results and discussion, conclusions and recommendation; writing a complete thesis; research progress must be presented each semester

6.3 Elective subject**859-521 Community Nutrition****2(2-0-4)**

Distribution of population; economic and social status; relationship between food safety and food, nutrition stability; nutrients; illness caused malnutrition; status of community nutrition in Thailand; guidance to improve and manage the diet and nutritional status of Thailand; case study

859-522 Nutrition in Health and Disease**3(3-0-6)**

Relationship of nutrition in health and disease; illness and disease from malnutrition such as chronic non-communicable diseases including diabetes, high blood pressure, cardiovascular disease; anatomical disorder, nutritional assessment; important diseases; role of food, dietary supplement and diet therapy in their prevention and care; case study

859-523 Toxicology and Safety Evaluation in Nutraceutical and Functional Food 3(2-3-4)

Adverse effect of non-nutritional components of food in terms of carcinogenesis; mutagenesis and teratogenesis; toxicity caused by over consumption of food or other sources containing excess nutrients; evaluation of toxicity; factors affecting toxicity; mechanism of toxicity in systems of the body; signs of toxic; to solve the poisoning; the therapy and analysis of different types of toxins; study of efficiency and safety *in vitro*; animal cell culture, animal study and clinical test of bioactive agents and product; and laboratory

859-524 Advanced Nutritional Biochemistry **3(3-0-6)**

Advance in protein and amino acids; production technology of protein and amino acids for food and medicine; nutritional approach and health enhance by protein and amino acids; advance in carbohydrate and lipid on regulation and function; metabolism of carbohydrate and lipid affect to health and diseases; advance of water and fat soluble vitamins with mineral and trace elements affect to health and diseases; metabolism of action of protein carbohydrate lipid vitamin and mineral affect to genetic expression; up-to-date research in nutritional biochemistry of protein, amino acids, carbohydrate, lipid, vitamin, mineral, and trace element

859-531 Functional Ingredient in Nutraceutical and Functional Food **3(3-0-6)**

Functional ingredients that have properties in anti-aging; antioxidant; effect to bone and teeth; to make calm and sleepiness; effect to brain and memory; dietary fiber and functional ingredients impact to digestive tract; involve in energy balance; involve in eyes and vision; impacts to cardiovascular diseases; involve in immunity system; impact to joint and inflammation; for weight control; for beauty; amount and dosage form; manufacturer and distributor; applications of functional ingredient in nutraceutical and functional food

859-532 Nutrigenomics and Nutricosmetics **3(3-0-6)**

Overview of nutrigenomics and nutrigenetics; mechanism of epigenetic modification; gene polymorphism and respond to diet; bioactives, function and interaction of molecules with genes; anti-aging in cellular level and retardation of biological activity; nutricosmetics on skin, hair and figure; bioactive ingredients and control of gene expression; Up-to-date knowledge in nutrigenomics and nutrigenomics

859-533 Nutraceutical and Functional Food Development **3(2-3-4)**

Importance of nutraceutical and functional food development; supply chain of nutraceutical and functional food; relationship between consumer and market; relationship among social, industry and technology; consumer and marketing research; guideline of nutraceutical and functional food development; product development from laboratory to production in pilot plant; project feasibility study; safety, regulation and standard of nutraceutical and functional food; case study

859-534 Selected Topics in Functional Food and Nutrition 3(2-3-4)

Up-to-date and interesting topics in the area of functional food and nutrition such as nutrigenomics and nutrigenetics; functional food ingredient; animal cell culture for testing of biological activities; probiotic and prebiotic; herbs and spices; bioactive peptide; membrane for production of bioactive compound; antioxidants technique and analysis of bioactive compounds

859-535 Health Food of ASEAN 3(3-0-6)

Biodiversity, history and originality of health food in ASEAN; safety, security, sustainability, and quality control of health food; ASEAN grains; antiaging and longevity ASEAN food; health food from fruits and vegetables, fermented foods, herbs, spices and curry in ASEAN; Halal health food and food processing according to Islam religion; alternative medicine and treatment for health promotion; health food and functional ingredient in ASEAN; nutritional policies and food regulation in ASEAN; visiting of factory or SME producing health food or knowledge and experience sharing by entrepreneur

859-542 Chemical Analysis of Bioactive Agents 3(2-3-4)

Method of sample preparation, purification and analysis of potential bioactive substances such as phytoestrogens; conjugated double bond fatty acid and Ω -3,6 fatty acid; carotenoids and flavonoids substances amino acids; carbohydrate and related compounds compile with food; dietary supplement and functional food standard using chromatography (TLC, GC, HPLC) and spectroscopy techniques (UV-Vis, NMR, FTIR) or appropriate technique; laboratory of analysis method by previous technique

859-543 Regulation and Standard, Registration of Nutraceutical and Functional Food 2(2-0-4)

Importance of regulation; registration and standard of nutraceutical and functional food on product; consumer and business of nutraceutical and functional food; regulation and standard of nutraceutical and functional food in Thailand, U.S.A., EU and Japan; regulation and standard for safety of nutraceutical and functional food; health claim and marketing of nutraceutical and functional food; role of Thai FDA for market promotion of nutraceutical and functional food; example of approved nutraceutical and functional food by Food and Drug Administration

859-551 Entrepreneur and Innovation of Nutraceutical and Functional Food 3(3-0-6)

Construction of idea for entrepreneur or startup of nutraceutical and functional food business; principles of business management; marketing management and sale forecasting; business management and project feasibility study, business project writing of nutraceutical and functional food; nutraceutical and functional food business; finance and accounting of small business; retail management and e-commerce management; patent searching and mapping and patent submission; innovation management and utilization of technology for business and commerce; law, taxation and source of money investment for business