Course Detail

Master of Science Program in Food Science and Technology (International Program)

1. Course Title:	Master of Science Program in Food Science and Technology (International Program)
2. Master Degree:	M.S. (Food Science and Technology)
3. Academic Institution:	Faculty of Agro-Industry, Chiang Mai University
4. Duration:	2 years (June 2025 – May 2027)

5. Background and Rational:

The Master of Science in Food Science and Technology (International Program) at the Faculty of Agro-Industry, Chiang Mai University, Thailand offers a comprehensive, research-oriented program designed to develop expertise in food science, technology, and innovation. Chiang Mai University (CMU) is one of Thailand's leading institutions, and its food science program is particularly well-regarded for its integration of traditional food knowledge with modern science and technology. The curriculum tailored for innovation and sustainability. It is designed to foster innovation in food production and research, ensuring that graduates can contribute to advancements in food technologies, product development, food safety and sustainable food systems. The program is aligned with the United Nations' Sustainable Development Goals (SDGs), particularly those related to food security, zero hunger (SDG 2), good health and well-being (SDG 3), responsible consumption and production (SDG 12), and climate action (SDG 13). The program equips graduates to tackle food production challenges not only within the ASEAN region but also in a global context, making it suitable for students aiming to work in international development, food regulation, or global food enterprises.

CMU's Food Science and Technology program emphasis on research, providing students with the opportunity to engage in groundbreaking studies that address both local and global food industry challenges. Research areas include food innovation, food safety, functional foods, nutraceuticals, food preservation, and emerging technologies in food production. The program benefits from strong connections with both local industries and international research networks, such as The National Science Park, Food and Packaging Innovation Center, Hub of Talents for Plasma Technology, The Federation of Thai Industries, Thailand Food Valley, and National Innovation Agency. The program engages in university collaborations with academic and research institutions worldwide, giving students access to global expertise and opportunities for international exchange and research collaborations.

At CMU, the laboratories and learning facilities are equipped with state-of-the-art technology to support experimental research in food science and technology and related areas,

giving students the tools to explore novel solutions for industry. Besides fully equipped food processing tools, innovative technologies such as super critical fluid extractor, molecular distillation system, 3D printing apparatus, high pressure unit, plasma technology, nanoencapsulation systems, etc., and advanced analytical instruments for physical, chemical, biological, sensory and human nutrition analysis such as FTIR, SEM, DSC, GC-MS, Real time PCR, etc. (Examples can be viewed at https://youtu.be/DMd0gnJUI5o). Moreover, the academic faculties are excellently equipped with expertise as well as high reputations in research and publications which cover all areas of food science and technology and readily available to teach and support students to accomplish their goals. Supportive staff and scientists are well trained and highly experienced to assist students in their study and research. Learning experiences of past and current students can be reviewed at https://youtu.be/XvTpbG8DX1s.

6. Objectives:

6.1 To equip students with knowledge, ability and skills in food production operations and food quality control using advanced food technology, including the ability to conduct research and create innovations in food science and technology by critical thinking, analyzing and integrating theoretical concepts in food science and advanced technology in the development of food industry.

6.2. To develop students with morality, ethics and maturity in practicing a profession in both the public and private sectors, with the ability to analyze and solve problems systematically and ethically.

6.3. To equip students with the ability to disseminate knowledge at both local and international levels, exchange knowledge with academics and personnel in food industry organizations to develop food industry organizations to meet international standards.

6.4. To develop students to have good human relations, communications, use information technology in various ways, and can plan for self-improvement and organization effectively.

7. Course Synopsis and Methodology:

7.1. Study plan

7.1.1. Plan 1 (Academic Type)

Degree requirements	**36**	**credits**
1. Thesis		
601797 FST 797 Master's Thesis	36	credits
2. Academic activities		

1) Present a seminar on the topic related to the thesis at least once per semester, in at least 2 semesters. A student must also attend a seminar every semester throughout the studying period.

2) Publish thesis according to the Announcement of the University, Subject: Criteria and Operating Procedure for Thesis Publication

2.1) The thesis or parts of the thesis have been published or at least accepted to be published in international journals or national journal in TCI tier 1, or national journals which are qualified and accepted in the field of food science and technology or related fields. The journal must regularly and continuously publish for at least 3 years. The quality of publications must be evaluated by at least 3 peer reviewers from various outside university. The journal can be published in both print and electronic, which have an exact schedule. Or published as a full paper in the proceedings of international conference, which was accepted in the field of food science and technology. The student must be listed as the first author of at least 1 thesis publication and the affiliation of the student in the major publication must be as follows: “Division of Food Science and Technology, Faculty of Agro-Industry, Chiang Mai University”.

OR

2.2) The thesis or parts of the thesis have been granted at least 1 patent or innovation. A patent must have a request number and readiness level (TRL/PRL) of 4 and above, or innovation must have readiness level (TRL/PRL/SRL) of 5 and above.

AND

2.3) The thesis or parts of the thesis has been presented in an international conference.

3. Non-credit Courses

1. University requirement: English language

2. Program requirement: in accordance with the consent of the adviser or the curriculum committee:

Students who did not graduate from the field of Food Science and Technology in Bachelor’s degree level are required to enroll in the subjects which will not be included as cumulative credits as following;

601702	FST 702	Food Processing and Engineering	4 credits
601704	FST 704	Food Microbiology and Analysis	2 credits
601705	FST 705	Food Chemistry and Analysis	2 credits

The assessment result will be presented in S/U grading: "S" stands for "satisfactory" and "U" stands for "unsatisfactory" works.

4. Comprehensive examination

The student must send a request form for comprehensive examination to Graduate School which is pre-approved by general or thesis advisers.

5. Study plan (Plan 1 (Academic type)

Year 1

Semester 1		**Credits**	**Semester 2**		**Credits**
	Register for university services	-	601797	Master's Thesis	12
	Organize seminar/ Attend seminar/present paper	-		Organize seminar/ Attend seminar/present paper	-
	Pass foreign language examination requirement	-			
	Total	**-**		**Total**	**12**

Year 2

Semester 1		**Credits**	**Semester 2**		**Credits**
601797	Master's Thesis	12	601797	Master's Thesis	12
	Organize seminar/ Attend seminar/present paper	-		Organize seminar/ Attend seminar/present paper	-
				Comprehensive Exam	
				Thesis Exam	
	Total	**-**		**Total**	**12**

Total 36 credits

7.1.2. Plan 2 (Academic type)

Degree requirements **a minimum of 36 credits**

A. Coursework **a minimum of** **24 credits**

1. Graduate Courses **a minimum of** **24 credits**

1.1 Subjects inside field of concentration a minimum of 24 credits

1.1.1 Required courses 18 credits

601714 FST 714 Modern Food Science and Technology 3 credits

601731 FST 731 Advanced Food Microbiology 3 credits

601745	FST 745	Advanced Food Processing and Technology	3 credits
601758	FST 758	Food Research Statistics	3 credits
601775	FST 775	Advanced Food Science and Food Analysis	4 credits
601791	FST 791	Seminar 1	1 credit
601792	FST 792	Seminar 2	1 credit
	1.1.2 Elective courses	a minimum of	6 credits

The students select elective courses as following:

Food Science Subjects

601711	FST 711	Cereal and Legume Chemistry	3 credits
601712	FST 712	Carbohydrate in Foods	3 credits
601765	FST 765	Food for Health	3 credits
601767	FST 767	Advanced Human Nutrition	3 credits
601768	FST 768	Protein Functionality and Application	3 credits
601769	FST 769	Nutrient Metabolism	3 credits
601770	FST 770	Nutrition in Health and Disease	3 credits
601771	FST 771	Nutritional Epidemiology	3 credits
601811	FST 811	Dairy Chemistry and Microbiology	3 credits
601844	FST 844	Advanced Food Stability	3 credits

Food Processing, Technology and Engineering Subjects

601722	FST 722	Enzymes in Food Processing	3 credits
601742	FST 742	Food Encapsulation Technology	3 credits
601743	FST 743	Food Powder Technology	3 credits
604715	FE 715	Physical and Engineering Properties of Foods	3 credits
604743	FE 743	Rheology of Foods and Biomaterials	3 credits
604751	FE 751	Postharvest System Engineering of Agricultural Products	3 credits
604761	FE 761	Drying Technology	3 credits
604762	FE 762	Frying Technology	3 credits
604764	FE764	Membrane Technology	3 credits
604765	FE 765	Extrusion Technology	3 credits
604766	FE 766	Nonthermal Food Processing	3 credits
604843	FE 843	Advanced Kinetic Analysis in Food Process Engineering	3 credits
604844	FE 844	Advanced Processing and Biochemistry of Functional	3 credits

		Foods	
604845	FE 845	Food Preservation by Pulsed Electric Fields	3 credits
604846	FE 846	Transport Phenomena in Food Processing	3 credits
604847	FE 847	Water Activity in Food Process Engineering	3 credits
604849	FE 849	Development of Mathematical Modeling and Simulation in Food Process Engineering with Visual Basic Applications Programming	3 credits

Design, Innovation, Management and Marketing Subjects

603724	PKT 724	Advanced Food Packaging Materials and Testing	3 credits
603743	PKT 743	Food Packaging Innovation	3 credits
603752	PKT 752	Food Packaging Design and Marketing	3 credits

Selected Topics in Food Science and Technology Subjects

601787	FST 787	Selected Topics in Food Science and Technology 1	1 credit
601788	FST 788	Selected Topics in Food Science and Technology 2	2 credits
601789	FST 789	Selected Topics in Food Science and Technology 3	3 credits

1.2 Other Courses

Select from subjects with a course code level of 700 or above with the consent of the graduate program administrative committee.

2. Advanced Undergraduate Subjects

In case the student lacks some basic knowledge, which is necessary for education, the student must enrol some advanced undergraduate courses(s) under the recommendation of program administrative committee.

B. Thesis

601799 Master's thesis 12 credits

C. Non-credit Courses

1. University requirement: - English language
2. Program requirement:

Students who did not graduate from the field of Food Science and Technology in Bachelor's degree level are required to enroll in the subjects which will not be included as cumulative credits as following;

601702	FST 702	Food Processing and Engineering	4 credits
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The assessment result will be presented in S/U grading: "S" stands for "satisfactory" and "U" stands for "unsatisfactory" works.

D. Academic activities

1. Present a seminar on the topic related to the thesis at least once per semester, in at least 2 semesters. A student must also attend a seminar every semester throughout the studying period.
2. Publish the thesis according to the Announcement of the University, Subject: Criteria and Operating Procedure for Thesis Publication

2.1) The thesis or parts of the thesis have been published or at least accepted to be published in international journals or national journal in TCI tier 1, or national journals which are qualified and accepted in the field of food science and technology or related fields. The journal must regularly and continuously publish for at least 3 years. The quality of publications must be evaluated by at least 3 peer reviewers from various outside university. The journal can be published in both print and electronic, which have an exact schedule. Or published as a full paper in the proceedings of international conference, which was accepted in the field of food science and technology. The student must be listed as the first author of at least 1 thesis publication and the affiliation of the student in the major publication must be as follows: "Division of Food Science and Technology, Faculty of Agro-Industry, Chiang Mai University".

OR

2.2) The thesis or parts of the thesis have been granted at least 1 patent or innovation. A patent must have a request number and readiness level (TRL/PRL) of 4 and above, or innovation must have readiness level (TRL/PRL/SRL) of 5 and above.

E. Study Plan (Plan 2 (Academic type))

Year 1

Semester 1		**Credits**	**Semester 2**		**Credits**
601714	Modern Food Science and Technology	3	601745	Advanced Food Processing and Technology	3
601731	Advanced Food Microbiology	3	601775	Advanced Food Science and Food Analysis	4
601758	Food Research Statistics	3		Elective courses	3
	Elective courses	3	601791	Seminar 1	1
	Organize seminar/ Attend seminar/present paper	-		Present thesis proposal	-
	Pass foreign language	-			

	examination requirement				
	Total	**12**		**Total**	**11**

Year 2

Semester 1		**Credits**	**Semester 2**		**Credits**
601792	Seminar 2	1	601799	Master's Thesis	6
601799	Master's Thesis	6		Thesis defense	-
	Total	**7**		**Total**	**6**

Total 36 credits

Thesis process

1. Pass the thesis proposal in semester 2/2025 (Nov 2025 – May 2026)
2. Take thesis defense exam in semester 2/2026 (Nov 2026 – May 2027)
3. Take seminar at least 1 time/semester for 2 times (Nov 2025 – May 2027)
4. Publishing paper in international journal, or in proceeding in order to graduate (June 2026 – May 2027)
5. The student who study in Plan 1 (Academic type) has to take comprehensive exam within semester 2/2026 (Nov 2026 – May 2027)

7.2. Course Content

601702 Food Processing and Engineering 4(3-3-6)

Pre-requisite : None

The principle of food engineering, mass and energy balances, momentum transfer, heat transfer, mass transfer, food processing and unit operations in food processing, food processing by adding heat, food processing by removing of heat and food processing at ambient temperature, changing in food properties during food processing

601704 Food Microbiology and Analysis 2(1-3-2)

Pre-requisite : By the instructor's consent

Food microbiology, for example food and foodborne disease, factors affected on type and quantity of microorganisms, changes in food caused from microorganisms, food spoilage and effects of processing on microbial survival. Principle of microbiological techniques to detect microorganisms in food.

601705 Food Chemistry and Analysis 2(1-3-2)

Pre-requisite : By the instructor's consent

Food analysis and sampling. Elementary food analysis (moisture content, total solid, Aw, ash, protein content, fiber content, crude fat content and pH). Carbohydrates. Proteins. Lipids. And advance food analysis theory of High Performance Liquid Chromatography (HPLC) Atomic Absorption Spectroscopy (AAS) UV-Visible Spectrophotometry (UV-Vis) and Gas Chromatography (GC)

601711 Cereal and Legume Chemistry 3(3-0-6)

Pre-requisite : By the instructor's consent

Chemical composition of cereal and legume: proteins, amino acids, carbohydrates, lipids, enzymes and color; anti-nutritional factors; physico-chemical properties of cereals and legumes

601712 Carbohydrate in Foods 3(3-0-6)

Pre-requisite : By the instructor's consent

Chemical, physico-chemical and functional properties, modification of carbohydrate's properties, sweetness theory, Interactions of carbohydrates and other food compositions, applications of carbohydrates in food industry

601714 Modern Food Science and Technology 3(3-0-6)

Pre-requisite : None

The roles of food and nutrition in health promotion. Novel food technology. Food safety and management system. Trends in food science and technology. Innovative product development

601722 Enzymes in Food Processing 3(2-3-4)

Pre-requisite : By the instructor's consent

Enzyme and its classification, enzyme activities kinetics, Major food enzymes and their application in food industries including enzymes for bread, pasta and noodles productions; enzymes in brewing; enzymes in fruit and vegetable juice extraction; enzymic modification of food protein; enzymes in starch modification and enzymes in the manufacture of dairy products

601731 Advanced Food Microbiology 3(2-3-4)

Pre-requisite : 601332, or by the instructor's consent

Significance of microorganisms and their toxins in food, controlling microbial spoilage in important food commodities, comprehension of distinctive foodborne microorganisms, survival,

injury and recovery of microorganisms after different processing methods, including thermobacteriology and advanced food processing, specific proposals for sampling and sampling plan, beneficial microorganisms, including starter culture and probiotic

601742 Food Encapsulation Technology 3(3-0-6)

Pre-requisite : By the instructor's consent

Significance of encapsulation technology in food industry, composition of capsule, type, structure, property and production of core and encapsulating materials, single core encapsulation technology, multiple core encapsulation technology, encapsulation efficiency, properties of capsules and analysis, mechanisms and kinetics of release of core material, selection of encapsulation technology for application in food industry, novel encapsulation technology and case study

601743 Food Powder Technology 3(3-0-6)

Pre-requisite : By the instructor's consent

Type and structure of food powders, principles and technologies for food powder production, production of powdered microcapsules, food powder properties and analysis, powder transport and storage technology, problems during processing, transport and storage of food powders and solving approaches, design and control of food powder processing, transport and storage, case study of industrial food powder production

601745 Advanced Food Processing and Technology 3(2-3-4)

Pre-requisite : By the instructor's consent

Principles of advanced thermal processing, advanced dehydration, high power ultrasound technology, ohmic heating, food processing by extrusion, heating by radiation, high pressure, membrane separation, supercritical fluid extraction, food preservation using hurdle technology, and novel food processing technology

601758 Food Research Statistics 3(2-3-4)

Pre-requisite : By the instructor's consent

Analysis of variance, experimental designs in food research, regression and correlation analysis, response surface analysis, optimization of food formulation and processing condition

601765 Food for Health 3(3-0-6)

Pre-requisite : None

The chemical, functional and nutritional properties of foods, natural antioxidants, phytochemicals, bioactive components, their roles as functional food, processing and identification techniques, important spices and herbs, health claims and validity of the claims

601767 Advanced Human Nutrition 3(3-0-6)

Pre-requisite : None

Body composition, Energy metabolism and dietary reference standard, Macronutrients and micronutrients, Nutrients and life cycle. Current topics

601768 Protein Functionality and Application 3(3-0-6)

Pre-requisite : None

Protein solubility, water holding capacity of protein, role of protein in food system, protein in emulsion, foaming properties of protein, protein gelation, protein-lipid interaction, protein-carbohydrate interaction, protein and flavor compounds, case study

601769 Nutrient Metabolism 3(3-0-6)

Pre-requisite : None

Nutrition and digestive system, body composition, energy expenditure and energy balance, metabolism of nutrients; carbohydrates, lipids, protein and amino acids, relationship of nutrients in metabolic pathways, roles of vitamins and minerals in metabolism of nutrients, fiber in nutrition and health, influence of genetic defects and diseases on metabolic disorders, case studies

601770 Nutrition in Health and Disease 3(3-0-6)

Pre-requisite : None

Positive and negative dietary influences on nutrition during the life cycle, how the dietary factors contribute to human health and healthy ageing, colonic health, nutrition and metabolic syndromes at risk for chronic disease.

601771 Nutritional Epidemiology 3(3-0-6)

Pre-requisite : By the instructor’s consent

Introduction to Nutritional Epidemiology, Basic terms and knowledge in Nutritional Epidemiology, Overview of observational and clinical study designs, Types and sources of nutritional data, Inferring a causal relation from diet to diseases, Types of biases in Nutritional Epidemiologic studies, Inferring a causal relation from diet to diseases, Types of biases in

Nutritional Epidemiologic studies, Sources of random and systematic errors, Randomized trials, Cohort studies, Case-control studies, Research topics in Nutritional Epidemiology

601775 Advanced Food Science and Analysis 4(3-3-6)

Pre-requisite : By the instructor's consent

Factors affecting the functional properties of food components, Food flavor and aroma, Food colorants, interactions and changes of food components during processing and storage Principles of instrumental analysis of foods; chromatography, Differential scanning calorimetry, Atomic absorption spectroscopy, Mass spectrometry and Electron Microscopy

601787 Selected Topics in Food Science and Technology 1 1(1-0-2)

Pre-requisite : By the instructor's consent

Lecture on current topics in food science and technology

601788 Selected Topics in Food Science and Technology 2 2(2-0-4)

Pre-requisite : By the instructor's consent

Lecture on current topics in food science and technology

601789 Selected Topics in Food Science and Technology 3 3(3-0-6)

Pre-requisite : By the instructor's consent

Lecture on current topics in food science and technology

601791 Seminar 1 1(1-0-2)

Pre-requisite: None

Students present the current topics in food science and technology or related fields of interest, they also present the progress reports of the research works

601792 Seminar 2 1(1-0-2)

Pre-requisite: 601791

Students present the current topics in food science and technology or related fields of interest, They also present the progress reports of the research work

601797 Master's Thesis 36 credits

Pre-requisite: Pass the thesis proposal, and enroll this course in the following semester after passing the thesis proposal, or in the semester that the student take thesis proposal

601799 Master's Thesis 12 credits

Pre-requisite: Pass the thesis proposal, and enroll this course in the following semester after passing the thesis proposal, or in the semester that the student take thesis proposal

601811 Dairy Chemistry and Microbiology 3(2-3-4)

Pre-requisite : By the instructor's consent

Casein, fat globules, cholesterol, enzymes, flavour and sensory properties, antimicrobial systems in raw milk, chemical changes during processing and storage, human pathogens, major control points during processing, dairy starters, classification of dairy

601844 Advanced Food Stability 3(2-3-4)

Pre-requisite : By the instructor's consent

Stability of protein molecules during processing and storage, structural changes of proteins and analysis, structural and molecular changes of carbohydrates during processing and storage, oxidative mechanisms and the effects on food stability, component migration during storage and the effects on food stability, water activity and monolayer moisture and their effects on food stability, mechanism and role of antioxidants on food stability, analysis of molecular structure of foods by X-ray photoelectron spectroscopic, X-ray absorption spectroscopic and protein crystallographic methods, nano-science and food stability

603724 Advanced Food Packaging Materials and Testing 3(3-0-6)

Pre-requisite : By the instructor's consent

Properties of food packaging materials including glass, paper, metal, plastic and other composite, testing of physical, physic-chemical, chemical and thermal properties of packaging materials, advanced testing of food packaging and packaging for transportation of food

603743 Food Packaging Innovation 3(3-0-6)

Pre-requisite : By the instructor's consent

Active packaging for example antimicrobial and antioxidant packaging, other active packaging such as oxygen absorber, moisture absorber, ethylene scavenger, intelligent packaging, food packaging development, shelf-life evaluation of moisture and oxygen sensitive food and innovation in food packaging

603752 Food Packaging Design and Marketing 3(3-0-6)

Pre-requisite : By the instructor's consent

Marketing principles of food products, designs principles related to color, graphic, brand and printing, Packaging regulations, packaging design structure, shape and material selection, packaging design for distribution to reduce damage loss, printing systems for food packaging, business planning for food packaging

604715 Physical and Engineering Properties of Foods 3(3-0-6)
Pre-requisite : None

Structure and composition of foods, Physical characteristics of foods, Mechanical properties of foods, Thermal properties of foods, Electrical properties of foods, Optical properties of foods

604743 Rheology of Foods and Biomaterials 3(2-3-4)
Pre-requisite : None

This course studies the deformation of foods and biomaterials under the action of force, relationship between stress and strain, flow behavior of Newtonian and Non-Newtonian fluids, theoretical analysis and mathematical models for flow behavior and deformation of foods and biomaterials, flow behavior and deformation of foods and biomaterials in rheological measuring devices, operational principle of rheological measuring devices and measurement of rheological properties, molecular theory of viscoelastic materials, rheological properties of complex foods and biomaterials, effects of rheological properties on food processing and sensory assessment, nano-rheology and case study

604751 Postharvest System Engineering of Agricultural Products 3(3-0-6)
Pre-requisite: By the instructor’s consent

Role and importance of postharvest systems, internal and external factors affecting quality of fresh produce, engineering aspects of postharvest handling systems for cereal and horicultural crops, psychrometrics and postharvest operations, design of aeration and cooling systems for fresh produce, low temperature storage, controlled atmosphere and modified atmosphere storage, energy management in postharvest systems, developments and trends in postharvest technology

604761 Drying Technology 3(3-0-6)
Pre-requisite: By the instructor’s consent

Theory of drying, drying systems, heat and mass transfer in drying, mathematical modeling and simulation in drying, drying of agricultural products and energy analysis in drying.

604762 Frying Technology 3(3-0-6)

Pre-requisite: By the instructor's consent

Deep frying, frying fats and oils, factors affecting the quality of frying fats and oils, fried food product qualities, heat and mass transfer in food during frying, oil absorption in fried food products, used oil management, fried food products, effects

604764 Membrane Technology 3(3-0-6)

Pre-requisite: By the instructor's consent

Potentials of membrane processing, type of membrane, membrane properties, membrane modules, fouling and cleaning, microfiltration, ultrafiltration, reverse osmosis, pervaporation, gas separation, membrane distillation, liquid membrane, electrodialysis and application in industries

604765 Extrusion Technology 3(2-3-6)

Pre-requisite: By the instructor's consent

Principles of extrusion technology, extruder types, extrusion parameters and measurements, raw materials for extrusion processes, rheological changes of foods during extrusion, applications of extrusion technology, and nutritional properties of extruded products

604766 Nonthermal Food Processing 3(3-0-6)

Pre-requisite: By the instructor's consent

High pressure processing, pulsed magnetic fields processing, oscillating magnetic fields processing, light pulses processing, application of chemicals and biochemicals in food processing, irradiation processing, and hurdle processing

604843 Advanced Kinetic Analysis in Food Process Engineering 3(3-0-6)

Pre-requisite : By the instructor's consent

Law of mass action, order of reaction, history of kinetic study, construction of kinetic equations based on King and Altman's method, construction of kinetic curves based on Euler's and fourth-order Runge-Kutta's methods, analysis of coefficients for rate of reaction, applications of computer programming in the analysis of constants from kinetic curve, analysis of lactic acid production kinetic, analysis of ethanol production using various sugars as substrates, analysis of biotransformation kinetic

604844 Advanced Processing and Biochemistry of Functional Foods 3(3-0-6)

Pre-requisite : None

Source and health benefit of bioactive compounds, advance processing of functional food, machinery and advance technology in functional food processing, plant design for functional food production

604845 Food Preservation by Pulsed Electric Fields 3(3-0-6)

Pre-requisite : By the instructor's consent

Pulsed electric field principle, electrical properties of foods, equipment in food preservation by pulsed electric fields, kinetics of inactivation of microorganisms and enzymes in the presence of high intensity of electric fields, quality and safety of foods treated by pulsed electric fields, use of hurdle technology combined with pulsed electric fields, application of pulsed electric fields in various food processes

604846 Transport Phenomena in Food Processing 3(3-0-6)

Pre-requisite : By the instructor's consent

Mass heat and momentum transfer in food processes, simultaneous mass heat and momentum transfer in food processes, mathematical models for food processes, transport phenomena in multi-phase system, transport phenomena in the important food processes such as drying, frying, microwave processing, extraction, cooling by forced-convective heat transfer, separation by membrane

604847 Water Activity in Food Process Engineering 3(3-0-6)

Pre-requisite : By the instructor's consent

Importance of water and water activity in foods, relationship between water activity and glass transition, sorption isotherms of foods, relationship between water activity and microbial growth, relationship between water activity and chemical changes, diffusion of water and water adsorption kinetics of foods, desorption of water in drying, application of water activity in food industry

8. Graduation Conditions:

8.1. Plan 1 (Academic Type)

1. Present a seminar on the topic related to the thesis at least once per semester, in at least 2 semesters. A student must also attend a seminar every semester throughout the studying period.
2. Publish thesis according to the Announcement of the University, Subject: Criteria and Operating Procedure for Thesis Publication

2.1. The thesis or parts of the thesis have been published or at least accepted to be published

in international journals or national journal in TCI tier 1, or national journals which are qualified and accepted in the field of food science and technology or related fields. The journal must regularly and continuously publish for at least 3 years. The quality of publications must be evaluated by at least 3 peer reviewers from various outside university. The journal can be published in both print and electronic, which have an exact schedule. Or published as a full paper in the proceedings of international conference, which was accepted in the field of food science and technology. The student must be listed as the first author of at least 1 thesis publication and the affiliation of the student in the major publication must be as follows: "Division of Food Science and Technology, Faculty of Agro-Industry, Chiang Mai University".

OR

2.2. The thesis or parts of the thesis have been granted at least 1 patent or innovation. A patent must have a request number and readiness level (TRL/PRL) of 4 and above, or innovation must have readiness level (TRL/PRL/SRL) of 5 and above.

AND

2.3. The thesis or parts of the thesis has been presented in an international conference.

8.2. Plan 2 (Academic Type)

1. Present a seminar on the topic related to the thesis at least once per semester, in at least 2 semesters. A student must also attend a seminar every semester throughout the studying period.
2. Publish the thesis according to the Announcement of the University, Subject: Criteria and Operating Procedure for Thesis Publication

2.1. The thesis or parts of the thesis have been published or at least accepted to be published in international journals or national journal in TCI tier 1, or national journals which are qualified and accepted in the field of food science and technology or related fields. The journal must regularly and continuously publish for at least 3 years. The quality of publications must be evaluated by at least 3 peer reviewers from various outside university. The journal can be published in both print and electronic, which have an exact schedule. Or published as a full paper in the proceedings of international conference, which was accepted in the field of food science and technology. The student must be listed as the first author of at least 1 thesis publication and the affiliation of the student in the major publication must be as follows: "Division of Food Science and Technology, Faculty of Agro-Industry, Chiang Mai University".

OR

2.2 The thesis or parts of the thesis have been granted at least 1 patent or innovation. A patent must have a request number and readiness level (TRL/PRL) of 4 and above, or innovation must have readiness level (TRL/PRL/SRL) of 5 and above.

9. Applicant Qualifications

1. This will be in accordance with the Chiang Mai University Announcement of Candidates Eligible for Admission to an International Graduate Program for each academic year.

2. The students must complete a Bachelor's degree in the field of Food Science and Technology, Food Processing Technology, Packaging Technology, Marine Product Technology, Product Development Technology, Biotechnology, Nutrition Sciences or other related fields, with a minimum grade point average (GPA) of 2.50 and graduated from either educational institutions accredited by the Office of Higher Education Commission or from other institutions with grade point equivalent to 2.50

3. Pass the fundamental English language qualification and show the proof of English test which must be valid within 2 years from the counting time of the application date. The evidence must indicate the minimum standards in the Announcement of Graduate School, Chiang Mai University No. 22/2564 Subject: Foreign Language Conditions for Graduate Students as below:

Institute	**English score for enrolling a doctoral degree student**	**Score for thesis proposal submission/graduation for master's degree**	**Score for thesis proposal submission/graduation for all international and doctoral programs**
CMU-eTEGS	45	60	65
IELTS	4.0	5.0	5.5
TOEFL	ITP: 430CBT: 117IBT: 39	ITP: 450CBT: 133IBT: 45	ITP: 523CBT: 193IBT: 69
TOEIC	-	650*	-
CU-TEP **	45%	60%	65%
TU-GET/ TU-GET(CBT)**	45%	60%	65%
KU-EPT **	45%	60%	65%
DynEd	0.5 (CEFR = A1)	2.5 (CEFR = B2)	3.0 (CEFR = C1)
CMU e-Grad**	50%	70%	90%

Note: as mentioned in the attached documents

* Programs approved by the Graduate School Academic Administration Committee (GSAAC)

** The score must be not less than the specified percentage from the total score

4. For the lack of evidence or the applicant has the proof of English language which is resulted less scores than the required standards above (2.2.3.), the approval of admission will be considered on the consent of the curriculum management committee. In case that the applicant is accepted to the program, he/she must take an English proficiency test and provide further the proof of result which passes the requiring standards announced by the Graduate School, prior to submit the thesis topic and draft of proposal.

5. Other qualifications apart from those mentioned will be given according to the discretion of the Committee of Graduate Program in the Division of Food Science and Technology.

10. Document Required

- Official Transcript
- Official degree certification
- At least 2 Recommendation Letters
- English Test (must be valid within 2 years from the counting time of the application date)
- First passport page
- Research proposal (800 – 1,000 words)

11. Contact:

11.1 Program Committee

- Asst. prof. Dr. Pilairuk Intipunya (Program Chair, Master's degree of Science in Food Science and Technology (International Program))
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11.2 Program Co-ordinator

- Ms. Ornrawee Choomjai (International program co-ordinator)
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