

Department of Nutrition and Food Sciences (NFSC)

Chairperson:	Toufeili, Imad
Professors:	Hwalla, Nahla; Obeid, Omar; Olabi, Ammar; Toufeili, Imad
Associate Professors:	Abiad, Mohammad; Kharroubi, Samer; Naja, Farah; Nasreddine, Lara
Assistant Professors:	Fares, Elie Jacques; Jomaa, Lamis; Kassem, Issmat

Graduate Programs

The Department of Nutrition and Food Sciences offers four graduate programs of study leading to the MS degree in Food Safety, Food Technology, Nutrition, or Public Health Nutrition. Students can follow either a thesis or a non-thesis program of study.

The department conducts quality research in the following areas: Community Nutrition, Public Health Nutrition, Clinical Nutrition, Nutritional Biochemistry, Nutrition Epidemiology, Food Chemistry, Food Microbiology, Food Safety, Food Packaging, and Sensory Evaluation of Food.

For more information about the graduate programs, please refer to the NFSC website: www.aub.edu.lb/fafs/nfsc/GRstudies

MS in Nutrition

The MS in Nutrition program offers both thesis (30 cr.) and non-thesis (33 cr.) options, and is normally completed over two years on a full-time basis. The program provides students with advanced understanding of human nutrition at the individual and community levels and applies current research information and methods to nutrition practice.

Core Courses (Thesis)

NFSC 301 **Statistical Methods for Nutrition and Food Science** **2.3; 3 cr.**
This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. *Prerequisites: NFSC 210, STAT 210 or EDUC 227 and CMPS 209. Fall and Spring.*

NFSC 311 **Advanced Nutrition: Macronutrients** **3.0; 3 cr.**
Advances in carbohydrate, protein, lipid, fiber and energy metabolism. *Prerequisite: NFSC 274.*

NFSC 314	Advanced Nutrition: Minerals	3.0; 3 cr.
Advanced nutritional, biochemical, and physiological aspects of macro- and micro-mineral elements, and toxic elements in humans. <i>Prerequisite: NFSC 274.</i>		
NFSC 315	Advanced Nutrition: Vitamins	3.0; 3 cr.
Advanced nutritional, biochemical, and physiological aspects of vitamins and vitamin-like substances in humans. <i>Prerequisite: NFSC 274.</i>		
NFSC 395	Graduate Seminar in Nutrition and Food Science	1.0; 1 cr.
NFSC 396	Comprehensive Exam	0 cr.
NFSC 399	MS Thesis	9 cr.

Core Courses (Non-Thesis)

NFSC 301	Statistical Methods for Nutrition and Food Science	2.3; 3 cr.
This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. <i>Prerequisites: NFSC 210, STAT 210 or EDUC 227 and CMPS 209. Fall and Spring.</i>		
NFSC 300	Graduate Tutorial	1-3 cr.
Directed study.		
NFSC 311	Advanced Nutrition: Macronutrients	3.0; 3 cr.
Advances in carbohydrate, protein, lipid, fiber and energy metabolism. <i>Prerequisite: NFSC 274.</i>		
NFSC 314	Advanced Nutrition: Minerals	3.0; 3 cr.
Advanced nutritional, biochemical and physiological aspects of macro- and micro-mineral elements, and toxic elements in humans. <i>Prerequisite: NFSC 274.</i>		
NFSC 315	Advanced Nutrition: Vitamins	3.0; 3 cr.
Advanced nutritional, biochemical, and physiological aspects of vitamins and vitamin-like substances in humans. <i>Prerequisite: NFSC 274.</i>		
NFSC 395	Graduate Seminar in Nutrition and Food Science	1.0; 1 cr.
NFSC 396	Comprehensive Exam	0 cr.

Elective Courses for MS in Nutrition

- NFSC 300 Graduate Tutorial 1-3 cr.**
Directed study.
- NFSC 305 Sensory Evaluation of Food 3.0; 3 cr.**
Designed to help the food scientist solve typical sensory problems, select appropriate panelists for specific sensory tests, and conduct such tests, analyze and interpret the results, and write a report. *Prerequisite: STAT 210 or EDUC 227.*
- NFSC 306 Community Nutrition: Research and Intervention 3.0; 3 cr.**
The role of nutrition in improving the health and well-being of communities. Population nutritional status and needs assessment, as well as planning, implementing and evaluating community nutrition and emergency nutrition programs and policies. Identification and assessment of nutritional status in the community, nutritional surveys, program development, nutritional education planning policies, and nutritional ecology. *Prerequisites: NFSC 221 and NFSC 222.*
- NFSC 307 Nutritional Epidemiology 3.0; 3 cr.**
This course deals with the design, conduct, analysis, and interpretation of epidemiologic studies related to nutrition, particularly the relationship between nutritional status, diet and disease. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and Spring.*
- NFSC 308 Advanced Therapeutic Nutrition 3.0; 3 cr.**
Advances in nutritional care, metabolic changes, and dietary management of nutrition related diseases. *Prerequisites: NFSC 292 and NFSC 293.*
- NFSC 310 Advanced Food Biochemistry 3.0; 3 cr.**
Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified food. *Prerequisite: NFSC 261.*
- NFSC 312 Sports Nutrition 3.0; 3 cr.**
Nutritional needs for the various types of athletic performance, and selected ergogenic and ergolytic supplements as related to physical performance. *Prerequisite: NFSC 274.*
- NFSC 351 Food Safety: Contaminants and Toxins 3.0; 3 cr.**
General principles of food toxicology with emphasis on toxic constituents in plant, animal, marine, and fungal origin, contaminants and food processing induced toxins. Risk characterization and laws and regulations of food safety. *Prerequisite: NFSC 277.*
- NFSC 370 Food Product Development 3.0; 3 cr.**
Study of the chemical and physical properties of food ingredients. Designed to apply the product development process from idea generation to marketing. *Prerequisite: NFSC 287 or NFSC 288.*
- NFSC 391 Research Technique 1.6; 3 cr.**
Principles of animal experiments, analytical techniques, and instrumentation used in nutrition and food science research studies. *Prerequisite: NFSC 267.*

MS in Public Health Nutrition

The Master of Science in Public Health Nutrition is a new graduate program offered jointly by the Faculty of Agricultural and Food Sciences (FAFS) and the Faculty of Health Sciences (FHS) at AUB. Students may pursue the Master of Science in Public Health Nutrition in either a thesis or a non-thesis track. The successful completion of the degree will require 40 credit hours for both tracks. Credits must be earned within the Faculty of Agricultural and Food Sciences and the Faculty of Health Sciences.

For the non-thesis track, 38 credits out of the required 40 credits should be earned as core program courses, including a culminating experience and a practicum. Two credits must be acquired as one or two elective courses either earned within or at both faculties.

For the thesis track, students must complete a total of 34 credits as core courses and must work on a 6-credit thesis under the supervision of a thesis advisor and thesis committee and defend their thesis as per AUB graduate program policies.

The credit requirements for both the thesis and non-thesis track options are tabulated below.

Credit requirements for both the thesis and non-thesis options for the Master of Science in Public Health Nutrition

		Non- Thesis Track Credits	Thesis Track Credits
Year 1			
NFSC 301	Statistical Methods for Nutrition and Food Sciences	3	3
NFSC 307	Nutritional Epidemiology	3	3
PHNU 300	Fundamentals of Public Health Nutrition	3	3
FSEC 310	Food and Nutrition Security	3	3
HPCH 331	Theories in Health Promotion	2	2
HPCH 334	Qualitative Research in Health Promotion	2	2
PHNU 302	Nutrition-related Chronic Disease	3	3
Total year credits		19	19

Year 2			
HPCH 333	Social Marketing in Health Promotion	2	2
PHNU 304	Nutrition in Emergencies	2	2
PBHL 303	Design and Evaluation of Public Health Programs	3	3
NFSC 306 A	Community Nutrition	2	2
PBHL 304	Public Health Policy and Advocacy	3	3
PHNU 301	Nutrition in the Life Cycle	3	3
PHNU 390	Practicum	2	0
PHNU 391	Integrative Learning Experience	3	0
	Elective	1	0
PHNU 396	Comprehensive Exam	0	0
PHNU 399	Thesis	0	6
Total year credits		21	21
Total credits		40	40

Core Courses (Thesis)

NFSC 301 Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
 This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; critical appraisal of literature; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall and Spring.*

NFSC 306A Community Nutrition 2.0; 2 cr.
 In this course, students will be trained on the role of nutrition in improving the health and wellbeing of communities and will be equipped with skills required to conduct community-based assessment, as well as plan, implement, and evaluate community nutrition programs and policies. The course combines theory and practice where students will discuss, analyze, and experiment with the theories of behavioral change and will apply the principles of nutrition education when tackling specific nutritional problems. Students will be provided with experiential learning opportunities to assess the health and nutrition needs of specific population groups. In addition, this course will give students the opportunity to plan, implement, and evaluate small-scale nutrition interventions to improve the health and well-being of individuals within select communities. *Offered Spring.*

NFSC 307 Nutritional Epidemiology 3.0; 3 cr.
 This course deals with the design, conduct, analysis, and interpretation of epidemiologic studies related to nutrition, particularly the relationship between nutritional status, diet and disease. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall.*

PHNU 300 Fundamentals of Public Health Nutrition 3 cr.
 This course introduces students to the field of public health nutrition, covering the fundamental pillars of the field; nutrition status and needs assessments and planning, monitoring, and evaluating nutrition interventions. Students will be exposed to the theories and conceptual frameworks behind addressing nutrition-related health issues at a population level. *Offered Fall.*

HPCH 331 Theories in Health Promotion 2.0; 2 cr.
 This course focuses on theories utilized to understand health determinants and outcomes and to promote individual and population health. Students will critically examine perspectives from health promotion and other social science disciplines through theoretical readings and empirical case studies. They will also discuss the merits and challenges of using theory to analyze health and to intervene at multiple levels from the individual to the structural levels. *Offered Spring.*

HPCH 334 Qualitative Research in Health Promotion 2.0; 2 cr.
 The course develops learners' qualitative research skills to address a research question relevant to health promotion. Students engage through classroom discussions, role play and assignments to gain hands on experience in conducting qualitative research beyond class settings. Students learn about qualitative research designs and methods and then apply the research process by generating data, and analyzing the data to answer a research question of their choice. They will also learn how to evaluate the quality or rigor of a qualitative research proposal or manuscript. Topics include in-depth interviews, observations, focus groups, thematic analysis, research rigor and research ethics. *Offered Spring.*

PHNU 301 Nutrition in the Life Cycle 3.0; 3 cr.
 This course covers the nutritional needs of individuals in different stages of the life cycle, with a focus on maternal and child nutrition and nutrition in the elderly. *Offered Fall.*

PHNU 302 Nutrition-related Chronic Disease 3.0; 3 cr.
 This course covers the epidemiology, etiology, and the medical and nutritional management of chronic diseases whose etiologies are nutrition-related. *Offered Spring.*

HPCH 333 Social Marketing in Health Promotion 2.0; 2 cr.
 In this course, students will learn the theoretical underpinnings of social marketing, a framework used to develop strategies aimed to address social and public health issues and to design effective, sustainable, and ethically sound public health campaigns. As a service-learning course, students apply concepts acquired into the development of a social marketing plan for a local community partner organization, responding to selected public health issues. This course is offered in blended learning format and is based on a combination of different modes of delivery (online and face-to-face) and diverse models of teaching and learning styles, providing students with an interactive and meaningful learning environment. *Prerequisites: HPCH 331 and PBHL 303. Offered Fall.*

FSHC 310 Nutrition Security: Assessment and Intervention Strategies 3.0; 3 cr.
 This course introduces students to basic principles of nutrition security, community nutrition, and nutritional ecology; and highlights the role that nutrition plays in improving the health and wellbeing of communities. The course aims to equip students with the knowledge and skills required to conduct population-based nutrition research, assess the nutrition needs of a population, to plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and taking into consideration cultural, social, and contextual dimensions. *Offered Spring.*

PHNU 304 Nutrition in Emergencies 2.0; 2 cr.
 This course covers evidence-based community nutrition interventions in emergency situations that place vulnerable populations at risk of food insecurity and consequent malnutrition. *Offered Fall.*

PBHL 303 Design and Evaluation of Public Health Programs 2.2; 3 cr.
 This course introduces students to the concepts and methods of public health program design and evaluation. Students will develop skills for assessing population needs for the development of health programs. The course then covers public health program design, including developing measurable objectives, identifying evidence-based intervention strategies, and planning for program implementation. Students will learn to select appropriate methods for impact and process evaluation of health programs. *Prerequisite: PBHL 310 and PBHL 312. Offered Spring*

PBHL 304 Public Health Policy and Advocacy 3.0; 3 cr.
 This course introduces students to the relevant concepts and approaches in public health policy and advocacy. It will provide students with a basic understanding of the public health policymaking process as well as the basic elements of advocacy. The aim is to make MPH students informed of the complex nature about public health policy development, be critical consumers of health policy research and evidence, and analytical of the influence of various actors on the policy process. Students will learn the stages of the policy process (i.e., agenda setting, policy development, policy implementation and policy evaluation). The field draws upon numerous disciplines. As such, course readings will be drawn from political science, sociology, biomedical sciences and policy studies. Students will also cover the basic elements of an advocacy process, including defining the issue, understanding the audiences and crafting advocacy strategies. Case studies, class discussions, and guest speakers will provide tangible examples of public health policy and advocacy processes at the national, regional and international levels. Ethics and equity considerations will be included in discussions related to concepts and application. *Offered Spring.*

PHNU 396 Comprehensive Exam 0 cr.

PHNU 399 MS Thesis 6 cr.

Core Courses (Non-Thesis)

NFSC 301 **Statistical Methods for Nutrition and Food Sciences** **2.3; 3 cr.**

This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; critical appraisal of literature; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall and Spring.*

NFSC 306A **Community Nutrition** **2.0; 2 cr.**

In this course, students will be trained on the role of nutrition in improving the health and wellbeing of communities and will be equipped with skills required to conduct community-based assessment, as well as plan, implement, and evaluate community nutrition programs and policies. The course combines theory and practice where students will discuss, analyze, and experiment with the theories of behavioral change and will apply the principles of nutrition education when tackling specific nutritional problems. Students will be provided with experiential learning opportunities to assess the health and nutrition needs of specific population groups. In addition, this course will give students the opportunity to plan, implement, and evaluate small-scale nutrition interventions to improve the health and well-being of individuals within select communities. *Offered Spring.*

NFSC 307 **Nutritional Epidemiology** **3.0; 3 cr.**

This course deals with the design, conduct, analysis, and interpretation of epidemiologic studies related to nutrition, particularly the relationship between nutritional status, diet and disease. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall.*

PHNU 300 **Fundamentals of Public Health Nutrition** **3 cr.**

This course introduces students to the field of public health nutrition, covering the fundamental pillars of the field; nutrition status and needs assessments and planning, monitoring, and evaluating nutrition interventions. Students will be exposed to the theories and conceptual frameworks behind addressing nutrition-related health issues at a population level. *Offered Fall.*

HPCH 331 **Theories in Health Promotion** **2.0; 2 cr.**

This course focuses on theories utilized to understand health determinants and outcomes and to promote individual and population health. Students will critically examine perspectives from health promotion and other social science disciplines through theoretical readings and empirical case studies. They will also discuss the merits and challenges of using theory to analyze health and to intervene at multiple levels from the individual to the structural levels. *Offered Spring.*

HPCH 334 **Qualitative Research in Health Promotion** **2.0; 2 cr.**

The course develops learners' qualitative research skills to address a research question relevant to health promotion. Students engage through classroom discussions, role play and assignments to gain hands on experience in conducting qualitative research beyond class settings. Students learn about qualitative research designs and methods and then apply the research process by generating data, and analyzing the data to answer a research question of their choice. They will also learn how to evaluate the

quality or rigor of a qualitative research proposal or manuscript. Topics include in-depth interviews, observations, focus groups, thematic analysis, research rigor and research ethics. *Offered Spring.*

PHNU 301 Nutrition in the Life Cycle 3.0; 3 cr.
This course covers the nutritional needs of individuals in different stages of the life cycle, with a focus on maternal and child nutrition and nutrition in the elderly. *Offered Fall.*

PHNU 302 Nutrition-related Chronic Disease 3.0; 3 cr.
This course covers the epidemiology, etiology, and the medical and nutritional management of chronic diseases whose etiologies are nutrition-related. *Offered Spring.*

HPCH 333 Social Marketing in Health Promotion 2.0; 2 cr.
In this course, students will learn the theoretical underpinnings of social marketing, a framework used to develop strategies aimed to address social and public health issues and to design effective, sustainable, and ethically sound public health campaigns. As a service-learning course, students apply concepts acquired into the development of a social marketing plan for a local community partner organization, responding to selected public health issues. This course is offered in blended learning format and is based on a combination of different modes of delivery (online and face-to-face) and diverse models of teaching and learning styles, providing students with an interactive and meaningful learning environment. *Prerequisites: HPCH 331 and PBHL 303. Offered Fall.*

FSEC 310 Nutrition Security: Assessment and Intervention Strategies 3.0; 3 cr.
This course introduces students to basic principles of nutrition security, community nutrition, and nutritional ecology; and highlights the role that nutrition plays in improving the health and wellbeing of communities. The course aims to equip students with the knowledge and skills required to conduct population-based nutrition research, assess the nutrition needs of a population, to plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and taking into consideration cultural, social, and contextual dimensions. *Offered Spring.*

PHNU 304 Nutrition in Emergencies 2.0; 2 cr.
This course covers evidence-based community nutrition interventions in emergency situations that place vulnerable populations at risk of food insecurity and consequent malnutrition. *Offered Fall.*

PBHL 303 Design and Evaluation of Public Health Programs 2.2; 3 cr.
This course introduces students to the concepts and methods of public health program design and evaluation. Students will develop skills for assessing population needs for the development of health programs. The course then covers public health program design, including developing measurable objectives, identifying evidence-based intervention strategies, and planning for program implementation. Students will learn to select appropriate methods for impact and process evaluation of health programs. *Prerequisite: PBHL 310 and PBHL 312. Offered Spring.*

PBHL 304 Public Health Policy and Advocacy 3.0; 3 cr.
 This course introduces students to the relevant concepts and approaches in public health policy and advocacy. It will provide students with a basic understanding of the public health policymaking process as well as the basic elements of advocacy. The aim is to make MPH student informed of the complex nature of public health policy development, be critical consumers of health policy research and evidence, and analytical of the influence of various actors on the policy process. Students will learn the stages of the policy process (i.e., agenda setting, policy development, policy implementation and policy evaluation). The field draws upon numerous disciplines. As such, course readings will be drawn from political science, sociology, biomedical sciences and policy studies. Students will also cover the basic elements of an advocacy process, including defining the issue, understanding the audiences and crafting advocacy strategies. Case studies, class discussions, and guest speakers will provide tangible examples of public health policy and advocacy processes at the national, regional and international levels. *Offered Spring.*

PHNU 390 Practicum 2.0; 2 cr.
 The practicum is considered an essential part of the curriculum of students. Students gain practical experience working with organizations engaged in developing, implementing and /or evaluating community-based public health nutrition programs. This experience may be purely research-based for students aiming for more academic careers. *Offered Spring.*

PHNU 391 Integrative Learning Experience 3.0; 3 cr.
 This course will allow students to apply knowledge and skills acquired throughout their graduate courses. Through this course, students will develop an understanding of how to conduct a community-based project or a research project beginning with the conception of ideas and concluding with depicting written results and discussing them, along with proper citations and procedures. *Offered Fall and Spring.*

PHNU 396 Comprehensive Exam 0 cr.

List of Elective Courses

HPCH 315 Basics of Health Communication 1.0; 1 cr.
 A course that provides basic knowledge in health communication. Students learn about the characteristics of effective health communication material. They also develop the needed skills to produce, test, and disseminate health communication messages to various audiences.

NFSC 395 Graduate Seminar in Nutrition and Food Science 1.0; 1 cr.
Offered Fall and Spring.

MS in Food Safety

Students may pursue a Master of Science in Food Safety with either a thesis track or a non-thesis track. Completion of the M.Sc. degree requires a total of 30 credit hours.

Master of Science in Food Safety (Thesis track)

Students in the thesis track are expected to complete a 9-credit thesis under the supervision of a thesis advisor and to defend their thesis as per AUB policies concerning graduate programs. Students should complete a comprehensive exam prior to the thesis defense. After satisfactory defense of the research work, the thesis should be approved by the supervisory committee members and deposited at the AUB Library.

Master of Science in Food Safety (Non-Thesis track)

Students in the non-thesis track are expected to complete a 3-credit project. Students can choose elective courses from within or outside FAFS. Non-thesis students must take at least 2 elective courses (6-credits) from different departments to expand their knowledge or from FAFS to pursue a specific topic in depth.

Credit Requirements for the Thesis and Non-Thesis Options for the Master of Food Safety:

Master of Science in Food Safety courses		Non- Thesis Track Credits	Thesis Track Credits
NFSC 350	Advanced Food Microbiology	3	3
NFSC 351	Food Safety: Contaminants and Toxins	3	3
EPHD 300	Epidemiology	2	2
NFSC 352	Food Safety Systems	3	3
NFSC 302	Food Safety Policy and Risk analysis	3	3
NFSC 301	Statistical methods in Nutrition and Food Science	3	3
NFSC 395	Graduate Seminar	1	1
NFSC 394	Internship	0	0
NFSC 300	Tutorial in Food Safety	3	3
NFSC 399	Thesis	-	9
NFSC 398	Project	3	-
NFSC 396-	Comprehensive Exam	-	-
Total core credits		24	30
Electives		6	-
Total Credits		30	30

Core Courses (Thesis)

EPHD 300 Principles of Epidemiology 1.5:0.5; 2 cr.
 This course introduces graduate students to the basic principles and methods of epidemiology and the application of the epidemiological approach to public health research, policy and practice. The course consists of weekly lectures and practical application sessions. Students will learn about the rubrics of epidemiology, dynamics of disease transmission, common sources of epidemiological data, measures of morbidity and mortality, observational study designs, measures of association, biases and confounding, and general principles of causation in epidemiology. The main concepts will be covered during the lecture. The application sessions (e.g., problem-solving exercises, case-studies, journal critiques, mapping...) will allow students to apply their acquired epidemiological knowledge and understand the role of epidemiological evidence in current practices of public health policy and practice.

NFSC 301 Statistical Methods for Nutrition and Food Science 2.3; 3 cr.
 This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. *Prerequisites: NFSC 210, STAT 210 or EDUC 227 and CMPS 209. Fall and Spring.*

NFSC 302 Food Safety Policy and Risk Analysis 3.0; 3 cr.
 This course allows students to develop a practical knowledge in risk analysis tools and models used to analyze food safety issues. It includes all components of risk analysis, assessment, management, communication; and decision-making processes. International food law, the transformations it is undergoing due to social, economic, and technological changes and its relationship to local and regional food laws. Examines standards that deal with food quality and safety, labeling, consumer rights and protection, regulatory agencies, government inspections and enforcement powers, and product liability.

NFSC 350 Advanced Food Microbiology 3.0; 3 cr.
 Advanced level food microbiology course examining microbes involved in food spoilage and preservation, foodborne illness (incidences, sources, mechanism of pathogenesis, biology and ecology of major pathogens, etc...). This course will provide a perspective in advanced topics in food microbiology and describe the essential principles of advanced techniques in food microbiology and safety.

NFSC 351 Food Safety: Contaminants and Toxins 3.0; 3 cr.
 The course will provide in-depth knowledge of toxins and allergens in food. It will cover the basic aspects of food and nutritional toxicology with primary emphasis on food components and food toxins. The natural toxins in food plants and animals, cancer modulating substances, mycotoxins, and all groups of contaminants such as pesticides, persistent organic pollutants (POP's), metals, packaging materials, hormones and animal drug residues will be topics stressed in the course. The purpose is to develop an understanding of the nature and properties of toxic substances and the magnitude of the hazards they present along with the biological response of the human body to such hazards.

NFSC 352	Food Safety Systems	3.0; 3 cr.
Students will examine current and emerging food safety concerns and management systems as preventative tools. Various food safety management systems are covered; HACCP, Food Traceability, GMPs, and recall systems. This course provides the knowledge needed in order to assist industries in meeting standards and applying different food safety systems requirements. In the course, students will be prepared to be certified for HACCP and ISO 22000.		
NFSC 394	Internship	0 cr.
A one to two month's internship in the food industry that allows students to broaden their experience on field. Weekly reports and work progress assessments should be presented to the advisor in order to follow-up with the students and ensure the diversity in their work.		
NFSC 300B	Graduate Tutorial	2 cr.
Students are assigned special topics of current interest and are required to write a report describing their work and evaluating the current status of the chosen subject.		
NFSC 395	Graduate Seminar in Nutrition and Food Science	1.0; 1 cr.
NFSC 396	Comprehensive Exam	0 cr.
NFSC 399	MS Thesis	9 cr.

Core Courses (Non-Thesis)

EPHD 300	Principles of Epidemiology	1.5:0.5; 2 cr.
This course introduces graduate students to the basic principles and methods of epidemiology and the application of the epidemiological approach to public health research, policy and practice. The course consists of weekly lectures and practical application sessions. Students will learn about the rubrics of epidemiology, dynamics of disease transmission, common sources of epidemiological data, measures of morbidity and mortality, observational study designs, measures of association, biases and confounding, and general principles of causation in epidemiology. The main concepts will be covered during the lecture. The application sessions (e.g., problem-solving exercises, case-studies, journal critiques, mapping...) will allow students to apply their acquired epidemiological knowledge and understand the role of epidemiological evidence in current practices of public health policy and practice.		
NFSC 301	Statistical Methods for Nutrition and Food Science	2.3; 3 cr.
This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. <i>Prerequisites: NFSC 210, STAT 210 or EDUC 227 and CMPS 209. Fall and Spring.</i>		

- NFSC 302** **Food Safety Policy and Risk Analysis** **3.0; 3 cr.**
 This course allows students to develop a practical knowledge in risk analysis tools and models used to analyze food safety issues. It includes all components of risk analysis, assessment, management, communication; and decision-making processes. International food law, the transformations it is undergoing due to social, economic, and technological changes and its relationship to local and regional food laws. Examines standards that deal with food quality and safety, labeling, consumer rights and protection, regulatory agencies, government inspections and enforcement powers, and product liability.
- NFSC 350** **Advanced Food Microbiology** **3.0; 3 cr.**
 Advanced level food microbiology course examining microbes involved in food spoilage and preservation, foodborne illness (incidences, sources, mechanism of pathogenesis, biology and ecology of major pathogens, etc...). This course will provide a perspective in advanced topics in food microbiology and describe the essential principles of advanced techniques in food microbiology and safety.
- NFSC 351** **Food Safety: Contaminants and Toxins** **3.0; 3 cr.**
 The course will provide in-depth knowledge of toxins and allergens in food. It will cover the basic aspects of food and nutritional toxicology with primary emphasis on food components and food toxins. The natural toxins in food plants and animals, cancer modulating substances, mycotoxins, and all groups of contaminants such as pesticides, persistent organic pollutants (POP's), metals, packaging materials, hormones and animal drug residues will be topics stressed in the course. The purpose is to develop an understanding of the nature and properties of toxic substances and the magnitude of the hazards they present along with the biological response of the human body to such hazards.
- NFSC 352** **Food Safety Systems** **3.0; 3 cr.**
 Students will examine current and emerging food safety concerns and management systems as preventative tools. Various food safety management systems are covered; HACCP, Food Traceability, GMPs, and recall systems. This course provides the knowledge needed in order to assist industries in meeting standards and applying different food safety systems requirements. In the course, students will be prepared to be certified for HACCP and ISO 22000.
- NFSC 394** **Internship** **0 cr.**
 A one to two month's internship in the food industry that allows students to broaden their experience on field. Weekly reports and work progress assessments should be presented to the advisor in order to follow-up with the students and ensure the diversity in their work.
- NFSC 300B** **Graduate Tutorial** **2 cr.**
 Students are assigned special topics of current interest and are required to write a report describing their work and evaluating the current status of the chosen subject.
- NFSC 395** **Graduate Seminar in Nutrition and Food Science** **1.0; 1 cr.**
- NFSC 396** **Comprehensive Exam** **0 cr.**
- NFSC 398** **Project** **3 cr.**

Elective Courses for the MS Degree in Food Safety

NFSC 307 Nutritional Epidemiology 3.0; 3 cr.

This course deals with the design, conduct, analysis, and interpretation of epidemiologic studies related to nutrition, particularly the relationship between nutritional status, diet and disease. (Writing intensive course)

PBHL 300 Foundations of Public Health 3 cr.

The course introduces students to the foundations, disciplines, values and ethics of the field of public health. The course also develops students' analytical thinking through the discussion of relevant published articles, particularly highlighting the interdisciplinary nature of the public health issue and the role of each of its five core disciplines (Environmental Health Sciences, Health Policy and Management/Health Administration, Epidemiology, Biostatistics and Health Promotion). (Writing intensive course)

EPHD 316 Epidemiology, Prevention and Control of Communicable Diseases 2.0; 2 cr.

This course explores the epidemiology, prevention and control of specific communicable diseases with major public health importance locally, regionally and globally. For each disease or group of similar diseases, the course will cover the epidemiological evidence, etiology and associated risk factors, and prevention and control strategies. The list of diseases included in the course will be modified according to changes in the dynamics of communicable diseases worldwide. *Prerequisite: EPHD 300 or consent of course instructor.*

HPCH 333 Social Marketing in Health Promotion 2.0; 2 cr.

In this course, students will learn the theoretical underpinnings of social marketing, a framework used to develop strategies aimed to address social and public health issues and to design effective, sustainable, and ethically sound public health campaigns. As a service-learning course, students apply concepts acquired into the development of a social marketing plan for a local community partner organization, responding to selected public health issues. This course is offered in blended learning format and is based on a combination of different modes of delivery (online and face-to-face) and diverse models of teaching and learning styles, providing students with an interactive and meaningful learning environment. *Prerequisites: HPCH 331 and PBHL 303. Offered Fall.*

NFSC 377 Food Packaging 3.0; 3 cr.

This course provides the students with the basic knowledge regarding food packaging materials, machinery and technology. It provides an overview of the elements of packaging science and engineering applied to the presentation, distribution and marketing of various food products.

NFSC 370 Food Product Development 3.0; 3 cr.

To learn the chemical and physical properties of food ingredients. To apply the product development process from idea generation to marketing.

NFSC 310 Advanced Food Biochemistry 3.0; 3 cr.

Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified foods. *Prerequisite: NFSC 261.*

MS in Food Technology

The M.Sc. in Food Technology program offers both thesis (30 cr.) and non-thesis (33 cr.) options, and is normally completed over two years on a full-time basis. The program provides training in food biochemistry, food safety, food engineering and rheology, sensory evolution, and food product development.

Core Courses (Thesis)

NFSC 301	Statistical Methods for Nutrition and Food Sciences	2.3; 3 cr.
This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. <i>Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring. AGSC 301 is also equivalent to this course.</i>		
NFSC 305	Sensory Evaluation of Food	3.0; 3 cr.
Designed to help the food scientist solve typical sensory problems; select appropriate panelists for specific sensory tests and conduct such tests, analyze and interpret the results, and write a report. <i>Prerequisite: STAT 210 or EDUC 227.</i>		
NFSC 310	Advanced Food Biochemistry	3.0; 3 cr.
Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified foods. <i>Prerequisite: NFSC 261.</i>		
NFSC 351	Food Safety: Contaminants and Toxins	3.0; 3 cr.
General principles of food toxicology with emphasis on toxic constituents in plant, animal, marine, and fungal origin, contaminants and food processing induced toxins. Risk characterization and laws and regulations of food safety.		
NFSC 371	Food Engineering	3.0; 3 cr.
Basic concepts and principles of food engineering and their applications; focus on engineering design and analysis of unit operations common to food processing. <i>Prerequisite: NFSC 291.</i>		
NFSC 395	Graduate Seminar in Nutrition and Food Science	1.0; 1 cr.
NFSC 396	Comprehensive Exam	0 cr.
NFSC 399	MS Thesis	9 cr.

Core Courses (Non-Thesis)

NFSC 301 Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.

This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. *NFSC 210 and CMPS 209. Fall and spring. AGSC 301 is also equivalent to this course.*

NFSC 305 Sensory Evaluation of Food 3.0; 3 cr.

Designed to help the food scientist solve typical sensory problems; select appropriate panelists for specific sensory tests and conduct such tests, analyze and interpret the results, and write a report. *Prerequisite: STAT 210 or EDUC 227.*

NFSC 310 Advanced Food Biochemistry 3.0; 3 cr.

Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified foods. *Prerequisite: NFSC 261.*

NFSC 351 Food Safety: Contaminants and Toxins 3.0; 3 cr.

General principles of food toxicology with emphasis on toxic constituents in plant, animal, marine, and fungal origin, contaminants and food processing induced toxins. Risk characterization and laws and regulations of food safety.

NFSC 371 Food Engineering 3.0; 3 cr.

Basic concepts and principles of food engineering and their applications; focus on engineering design and analysis of unit operations common to food processing. *Prerequisite: NFSC 291.*

NFSC 395 Graduate Seminar in Nutrition and Food Science 1.0; 1 cr.

NFSC 396 Comprehensive Exam 0 cr.

Elective Courses for the MS Degree in Food Technology

NFSC 300 Graduate Tutorial 1-3 cr.

Directed study.

Elective Courses for MS Degree

NFSC 306 Community Nutrition: Research and Intervention 3.0; 3 cr.

The role of nutrition in improving the health and well-being of communities. Population nutritional status and needs assessment; planning, implementing and evaluating community nutrition and emergency nutrition programs and policies. Identification and assessment of nutritional status in the community, nutritional surveys, program development, nutritional education planning policies, and nutritional ecology. *Prerequisites: NFSC 221 and NFSC 222.*

NFSC 307 Nutritional Epidemiology 3.0; 3 cr.

This course deals with the design, conduct, analysis, and interpretation of epidemiologic studies related to nutrition, particularly the relationship between nutritional status, diet and disease. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209.*

- NFSC 308 Advanced Therapeutic Nutrition 3.0; 3 cr.**
 Advances in nutritional care, metabolic changes, and dietary management of diseases.
Prerequisite: NFSC 274.
- NFSC 310 Advanced Food Biochemistry 3.0; 3 cr.**
 Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified foods. *Prerequisite: NFSC 261.*
- NFSC 311 Advanced Nutrition: Macronutrients 3.0; 3 cr.**
 Advances in carbohydrate, protein, lipid, fiber and energy metabolism.
Prerequisite: NFSC 274.
- NFSC 312 Sports Nutrition 3.0; 3 cr.**
 Nutritional needs for the various types of athletic performance, and selected ergogenic and ergolytic supplements as related to physical performance.
- NFSC 314 Advanced Nutrition: Minerals 3.0; 3 cr.**
 Advanced nutritional, biochemical, and physiological aspects of macro- and micro-mineral elements, and toxic elements in humans. *Prerequisite: NFSC 274.*
- NFSC 315 Advanced Nutrition: Vitamins 3.0; 3 cr.**
 Advanced nutritional, biochemical, and physiological aspects of vitamins and vitamin-like substances in humans. *Prerequisite: NFSC 274.*
- NFSC 370 Food Product Development 3.0; 3 cr.**
 Study of the chemical and physical properties of food ingredients. Designed to apply the product development process from idea generation to marketing.
Prerequisite: NFSC 287 or NFSC 288.
- NFSC 377 Food Packaging 3.0; 3 cr.**
 This course provides the students with the basic knowledge regarding food packaging materials, machinery and technology. It provides an overview of the elements of packaging science and engineering applied to the presentation, distribution and marketing of various food products. *Prerequisite: NFSC 291.*
- NFSC 391 Research Techniques 1.6; 3 cr.**
 Principles of animal experiments, analytical techniques, and instrumentation used in nutrition and food science research studies. *Prerequisite: NFSC 267.*