

# Department of Nutrition and Food Sciences (NFSC)

Chairperson:	Obeid, Omar
Professors:	Hwalla, Nahla; Obeid, Omar; Olabi, Ammar; Toufeili, Imad
Associate Professors:	Abiad, Mohammad; Kharroubi, Samer; Nasreddine, Lara
Assistant Professors:	Fares, Elie Jacques; Jomaa, Lamis <sup>1</sup>
Lecturers:	Chamieh, Marie Claire; Iskandar, Christelle

## 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, and a joint MS degree in Public Health Nutrition with the Faculty of Health Sciences (FHS). Students can follow either a thesis or a non-thesis program of study. The department also offers a PhD in Biomedical Sciences-Nutrition Track in collaboration with the Faculty of Medicine (FM).

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](http://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 an advanced understanding of human nutrition at the individual and community levels and applies current research information and methods to nutrition practice.

### Master of Science in Nutrition (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 Nutrition (Non-Thesis Track)

Students in the non-thesis track are expected to complete a 3-6 credit project (tutorial). Students can choose elective courses from within or outside FAFS upon the approval of their supervisor.

1) on leave

## Credit Requirements for Both the Thesis and Non-Thesis Options:

### MS Degree Requirements:

		Non-Thesis Track Credits	Thesis Track Credits
NFSC 301	Statistical Methods for Nutrition and Food Sciences	3	3
NFSC 311	Advanced Nutrition: Macronutrients	3	3
NFSC 314	Advanced Nutrition: Minerals	3	3
NFSC 315	Advanced Nutrition: Vitamins	3	3
NFSC 395	Graduate Seminar in Nutrition and Food Science	1	1
<b>Electives<sup>2</sup></b>		<b>14-17</b>	<b>5-8</b>
NFSC 396	Comprehensive Exam	0	0
NFSC 300	Graduate Tutorial	3-6	0-3
NFSC 399	MS Thesis	-	9
<b>Total year credits</b>		<b>33</b>	<b>30</b>

## Core Courses (Thesis)

**NFSC 301 Statistical Methods for Nutrition and Food Science 2.3; 3 cr.**  
This is an intermediate-level course in statistics. Topics include an 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. *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 395 Graduate Seminar in Nutrition and Food Science 1.0; 1 cr.**

**NFSC 396 Comprehensive Exam 0 cr.**

**NFSC 399 MS Thesis 9 cr.**

2) You can substitute Elective courses by taking additional Graduate Tutorial credits.

## Core Courses (Non-Thesis)

<b>NFSC 301</b>	<b>Statistical Methods for Nutrition and Food Science</b>	<b>2.3; 3 cr.</b>
This is an intermediate-level course in statistics. Topics include an 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>		
<b>NFSC 300</b>	<b>Graduate Tutorial</b>	<b>1-3 cr.</b>
Directed study.		
<b>NFSC 311</b>	<b>Advanced Nutrition: Macronutrients</b>	<b>3.0; 3 cr.</b>
Advances in carbohydrate, protein, lipid, fiber and energy metabolism. <i>Prerequisite: NFSC 274.</i>		
<b>NFSC 314</b>	<b>Advanced Nutrition: Minerals</b>	<b>3.0; 3 cr.</b>
Advanced nutritional, biochemical and physiological aspects of macro- and micro-mineral elements, and toxic elements in humans. <i>Prerequisite: NFSC 274.</i>		
<b>NFSC 315</b>	<b>Advanced Nutrition: Vitamins</b>	<b>3.0; 3 cr.</b>
Advanced nutritional, biochemical, and physiological aspects of vitamins and vitamin-like substances in humans. <i>Prerequisite: NFSC 274.</i>		
<b>NFSC 395</b>	<b>Graduate Seminar in Nutrition and Food Science</b>	<b>1.0; 1 cr.</b>
<b>NFSC 396</b>	<b>Comprehensive Exam</b>	<b>0 cr.</b>

## Elective Courses for MS in Nutrition

<b>NFSC 300</b>	<b>Graduate Tutorial</b>	<b>1-3 cr.</b>
Directed study.		
<b>NFSC 305</b>	<b>Sensory Evaluation of Food</b>	<b>3.0; 3 cr.</b>
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>		
<b>NFSC 306</b>	<b>Community Nutrition: Research and Intervention</b>	<b>3.0; 3 cr.</b>
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. <i>Prerequisites: NFSC 221 and NFSC 222.</i>		
<b>NFSC 307</b>	<b>Nutritional Epidemiology</b>	<b>3.0; 3 cr.</b>
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. <i>Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and Spring.</i>		

- 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 Techniques      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

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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
<b>Year 1</b>			
NFSC 301	Statistical Methods for Nutrition and Food Sciences	3	3
NFSC 306A	Community Nutrition	2	2
NFSC 307	Nutritional Epidemiology	3	3
PHNU 300	Fundamentals of Public Health Nutrition	3	3
PBHL 303	Design and Evaluation of Public Health Programs	3	3
PBHL 304	Public Health Policy and Advocacy	3	3
PHNU 304	Nutrition in Emergencies	2	2
HPCH 331	Theories in Health Promotion	2	2
HPCH 334	Qualitative Research in Health Promotion	2	2
<b>Total year credits</b>		<b>23</b>	<b>23</b>
<b>Year 2</b>			
HPCH 333	Social Marketing in Health Promotion	2	2
FSEC 310	Food and Nutrition Security	3	3
PHNU 301	Nutrition in the Life Cycle	3	3
PHNU 302	Nutrition-related Chronic Disease	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
<b>Total year credits</b>		<b>17</b>	<b>17</b>
<b>Total credits</b>		<b>40</b>	<b>40</b>

## 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 an 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. *Pre-requisites- PBHL 312 or (PHNU 300 and NFSC 307). Offered Spring.*

**HPCH 334                      Qualitative Health Research                      2 cr.**  
A course in which students advance their qualitative social research methodology and methods for public health research. Students revisit the underlying paradigms and use of qualitative methodology. Throughout this course, students refine their interviewing skills, train on how to manage qualitative data, apply systematic data analysis and produce a rigorous account of qualitative research findings through practical applications in Arabic and English. *Prerequisite: PBHL 310 and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301)*

**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 Fall.*

**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 a blended learning format 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, plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and while taking into consideration 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 Summer.*

**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. *Prerequisites: PBHL 310 (waived for PHNU students) and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301 & HPCH 334 (concurrently)). 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 of public health policy development, be critical consumers of health policy research and evidence, and be 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 in statistics. Topics include an 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 wellbeing 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. *Pre-requisites- PBHL 312 or (PHNU 300 and NFSC 307). Offered Spring.*

### **HPCH 334      Qualitative Health Research      2 cr.**

A course in which students advance their qualitative social research methodology and methods for public health research. Students revisit the underlying paradigms and use of qualitative methodology. Throughout this course, students refine their interviewing skills, train on how to manage qualitative data, apply systematic data analysis and produce a rigorous account of qualitative research findings through practical applications in Arabic and English. *PBHL 310 and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301).*



**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 Fall.*

**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 a 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, plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and while taking into consideration 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 Summer.*

**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. *Prerequisites: PBHL 310 (waived for PHNU students) and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301 & HPCH 334 (concurrently)) 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 of public health policy development, be critical consumers of health policy research and evidence, and be 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. *Part I offered Fall and Part II offered 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 - Thesis Track requires a total of 31 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 (8-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 301	Statistical Methods in Nutrition and Food Science	3	3
NFSC 310	Advanced Food Biochemistry	3	3
NFSC 350	Advanced Food Microbiology	3	3
NFSC 351	Food Safety: Contaminants and toxins	3	3
NFSC 352	Food Safety Systems	3	3
ENHL 311	Human Health Risk Assessment	3	3
MBIM 311	Bacteriology	3	3
NFSC 394	Internship	0	0
NFSC 395	Graduate Seminar	1	1
NFSC 396	Comprehensive Exam	0	0
NFSC 399	MS Thesis	-	9
NFSC 398/ NFSC 300C	Project/Tutorial	3	-
Total Core Credits		25	31
Electives		8	0
Total Credits		33	31

## Core Courses (Thesis)

<b>NFSC 301</b>	<b>Statistical Methods for Nutrition and Food Sciences</b>	<b>2.3; 3 cr.</b>
This is an intermediate-level course in statistics. Topics include an 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: STAT 210 or EDUC 227 and CMPS 209. Fall and spring. AGSC 301 is also equivalent to this course.		
<b>NFSC 310</b>	<b>Advanced Food Biochemistry</b>	<b>3.0; 3 cr.</b>
Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified foods. Prerequisite: NFSC 261.		
<b>NFSC 350</b>	<b>Advanced Food Microbiology</b>	<b>3.0; 3 cr.</b>
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.		
<b>NFSC 351</b>	<b>Food Safety: Contaminants and Toxins</b>	<b>3.0; 3 cr.</b>
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.		
<b>NFSC 352</b>	<b>Food Safety Systems</b>	<b>3.0; 3 cr.</b>
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.		
<b>NFSC 394</b>	<b>Internship</b>	<b>0 cr.</b>
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 diversity in their work.		
<b>NFSC 395</b>	<b>Graduate Seminar in Nutrition and Food Science</b>	<b>1.0; 1 cr.</b>
<b>NFSC 396</b>	<b>Comprehensive Exam</b>	<b>0 cr.</b>
<b>NFSC 399</b>	<b>MSThesis</b>	<b>9 cr.</b>

**ENHL 311                    Human Health Risk Assessment                    3 cr.**

**MBIM 311                    Bacteriology                    32.32; 3 cr.**  
A course on the characteristics and classification of medically important bacteria, diseases caused by bacteria, anti-bacterial agents, susceptibility testing, prophylaxis, and therapy.

## 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 an 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: STAT 210 or EDUC 227 and CMPS 209. Fall and spring. AGSC 301 is also equivalent to this course.

**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 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 diversity in their work.

<b>NFSC 395</b>	<b>Graduate Seminar in Nutrition and Food Science</b>	<b>1.0; 1 cr.</b>
<b>NFSC 396</b>	<b>Comprehensive Exam</b>	<b>0 cr.</b>
<b>NFSC 300</b> Directed study.	<b>Graduate Tutorial</b>	<b>1-3 cr.</b>
<b>NFSC398</b>	<b>Project</b>	<b>3 cr.</b>
<b>ENHL 311</b>	<b>Human Health Risk Assessment</b>	<b>3 cr.</b>
<b>MBIM 311</b>	<b>Bacteriology</b>	<b>32.32; 3 cr.</b>
A course on the characteristics and classification of medically important bacteria, diseases caused by bacteria, anti-bacterial agents, susceptibility testing, prophylaxis, and therapy.		

## Elective Courses for the MS Degree in Food Safety

**FSEC 300      Food Security: Challenges and Contemporary Debate      3 cr.**  
This course introduces concepts and principles of food security, namely availability, accessibility, utilization, and stability of food supply. Students are familiarized with the history of thought on food security, from Malthus to the Green Revolution to Sen and the inclusion of political and social factors in considering food security.

**FSEC 310      Nutrition Security: Assessment and Intervention Strategies      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.

**AGSC 376      Resource and Environmental Economics      3.0 cr.**  
A course that addresses and analyzes resource and environmental problems facing today's society, with an emphasis on providing the student with an intensive introduction to the qualitative theory necessary for an effective analysis of resource problems.

**AGSC 384      Rural Social Change, Development, and the Environment      3 cr.**  
This course provides an understanding of economic development and underdevelopment as it relates to environmental degradation and demographic, social and cultural change with special application to the economies of the Middle East.

**AVSC 304      Preventive Immunology and Patterns of Animal Diseases      3 cr.**  
Basic aspects of specific and non-specific body defense mechanisms and the role of vaccination in population protection; study of the patterns of diseases. Prerequisite: BIOL 224 or AVSC 224.

**AVSC 305- Poultry Diseases      3 cr.**  
Etiology, clinical characteristics, identification, prevention, and control of the major infectious and metabolic diseases of poultry.

**EHCL 317 Ethics and Law 1.5 cr.**  
 This course examines the ethical and legal principles which health leaders in Lebanon and the region need to take into consideration when making systems decisions. The course draws a distinction between public health ethics and medical ethics, and it provides tools for ethical decision-making in healthcare.

**ENSC 640 Toxicology & Environmental Health Hazards 3 cr.**  
 The course presents toxicology in three sections. In the first section, the fundamental principles and essentials of toxicology are introduced, particularly dose-response, toxicokinetic, and cellular mechanisms of action. In the second section, the course discusses toxicity of main organ systems. Classic toxicants that adversely affect health, emerging hazardous human exposures, and special topics are discussed in the last section of the course. The course includes lecture style presentations, collective case studies activities and student-led discussions. Topics of local and regional relevance are also introduced through hosting guest speakers.

**HMPD 314 Project Management 2 cr.**  
 A course that exposes students to current project management trends, best practices, and strategies that can aid in better management of projects and programs in health care settings.

**ENHL 312 Occupational Health 3 cr.**  
 This course overviews the general principles of occupational health, relating work, the work environment, and workers' health and wellbeing to general principles of social equity and justice. The course surveys research on the social, economic, political, environmental, and health elements of a workplace using multidisciplinary approaches. Students who join the course are able to identify occupational hazards and work-related injuries and illnesses in workplaces and propose monitoring, management and prevention strategies to lessen their impact on workers. With its emphasis on social justice, the course discusses the factors that make some workers' groups more vulnerable than others. Its unique approach emphasizes global perspectives and popular imaginations of workers through academic publications, newspaper journalism, cinema, lectures, and class discussions. This course is designed for students of multiple educational and training backgrounds and does not require prerequisite knowledge.

**BIOC 317 Special Topics in Biochemistry & Genetics a-j; 1 cr.**  
 A series of special elective courses (a-i), 1 credit each, which will emphasize the basic concepts and introduce recent developments in the fields of (a) Proteomics; (b) Metabolomics; (c) Genomics; (d) Lipidomics; (e) Enzymology; (f) Apoptosis; (g) Biochemistry of Inflammation; (h) Biochemical Toxicology; (i) Congenital Heart Problems; (j) Grant and Proposal Writing. Courses are open to medical doctors who would like to update their knowledge and to MSc/PhD graduates in biomedical and / or related fields. Elective. Prerequisite: Consent of coordinator. First/second /summer semester.

**PHRM 315 Principles of Pharmacology 2 cr.**  
 A course that covers the basic principles of drug action including pharmacokinetics, pharmacodynamics, pharmacogenetics, drug resistance, tolerance and toxicity, and pharmacovigilance.

**MNGT 306 Leadership and Behavior in Organizations 3 cr.**  
 This course sets the base for proper understanding and micro-level analysis of the role of individual and group behavior in organizations. It is designed as two independent modules; Module One Concerns Organizational Behavior while Module Two Concerns Leadership. The course will help students assimilate the different roles people play in an organization irrespective of their departmental positions or functional affiliations, and recognize the interactions inherent between people, structure, and environment. Particular attention is accorded to leadership as a focal point of group processes and a critical ingredient in successful organizational endeavors and transformations.

**MNGT 319 Change Management 3 cr.**  
 Examines in depth the change management process as a central paradigm in modern management theory and practice. The course spans a broad spectrum, including different change models and the various organizational forces that enable and resist change; and change processes at the individual, group, and organizational levels. The course also introduces theories, tools, approaches, and key competencies for managing change as well as practical case studies in the management of change.

**MKTG 306 Marketing Management 3 cr.**  
 This course deals with the fundamental aspects of managing and delivering marketing programs within a corporate context. Topics covered include analyzing marketing opportunities and channels; developing marketing strategies; marketing decision making, customer analysis and insight; product, pricing, communication, and promotion; and branding. The major elements of the marketing process and their relationship with each other will be thoroughly examined in local, regional, and international contexts through case examples. Additionally, students will delve into the analytical and research techniques used to make marketing decisions. The application of these techniques to marketing situations in both profit and non-profit organizations will be practiced through the use of case studies and individual assignments.

**MKTG 312- Consumer Behavior (Prerequisite MKTG 306) 3 cr.**  
 Uses a behavioral science perspective to describe, understand and predict the behavior of consumers in the marketplace. This course also magnifies the basic decision-making processes followed by consumers when faced with a choice situation.

## MS in Food Technology

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The M.Sc. in Food Technology program offers both thesis (31 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.

### Master of Science in Food Technology (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 Technology (Non-Thesis Track)

Students in the non-thesis track are expected to complete a 3-6 credit project (tutorial). Students can choose elective courses from within or outside FAFS upon the approval of their supervisor.

### Credit Requirements for Both the Thesis and Non-Thesis Options:

Master of Science in Food Technology		Non-Thesis Track Credits	Thesis Track Credits
NFSC 301	Statistical Methods in Nutrition and Food Science	3	3
NFSC 305	Sensory Evaluation of Food	3	3
NFSC 310	Advanced Food Biochemistry	3	3
NFSC 350	Advanced Food Microbiology	3	3
NFSC 370 or NFSC 377	Food Product Development or Food Packaging	3	3
NFSC 371	Food Engineering	3	3
ENHL 311	Human Health Risk Assessment	3	3
MBIM 311	Bacteriology	3	3
NFSC 394	Internship	0	0
NFSC 395	Graduate Seminar	1	1
NFSC 396	Comprehensive Exam	0	0
NFSC 399	MS Thesis	-	9
NFSC 398/ NFSC 300C	Project/Tutorial	3	-
Total Core Credits		25	31
Electives		8	0
Total Credits		33	31

## Core Courses (Thesis)

**NFSC 301**                    **Statistical Methods for Nutrition and Food Sciences**                    **2.3; 3 cr.**  
This is an intermediate-level course in statistics. Topics include an 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: STAT 210 or EDUC 227 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.*

<b>NFSC 351</b>	<b>Food Safety: Contaminants and Toxins</b>	<b>3.0; 3 cr.</b>
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.		
<b>NFSC 370</b>	<b>Food Product Development</b>	<b>3.0; 3 cr.</b>
Study of the chemical and physical properties of food ingredients. Designed to apply the product development process from idea generation to marketing. <i>Prerequisite: NFSC 287 or NFSC 288.</i>		
<b>NFSC 371</b>	<b>Food Engineering</b>	<b>3.0; 3 cr.</b>
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>		
<b>NFSC 377</b>	<b>Food Packaging</b>	<b>3.0; 3 cr.</b>
This course provides the students with 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. <i>Prerequisite: NFSC 291.</i>		
<b>NFSC 395</b>	<b>Graduate Seminar in Nutrition and Food Science</b>	<b>1.0; 1 cr.</b>
<b>NFSC 396</b>	<b>Comprehensive Exam</b>	<b>0 cr.</b>
<b>NFSC 399</b>	<b>MS Thesis</b>	<b>9 cr.</b>

## Core Courses (Non-Thesis)

<b>NFSC 301</b>	<b>Statistical Methods for Nutrition and Food Sciences</b>	<b>2.3; 3 cr.</b>
This is an intermediate-level course in statistics. Topics include an 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>NFSC 210 and CMPS 209. Fall and spring. AGSC 301 is also equivalent to this course.</i>		
<b>NFSC 305</b>	<b>Sensory Evaluation of Food</b>	<b>3.0; 3 cr.</b>
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>		
<b>NFSC 310</b>	<b>Advanced Food Biochemistry</b>	<b>3.0; 3 cr.</b>
Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified foods. <i>Prerequisite: NFSC 261.</i>		
<b>NFSC 351</b>	<b>Food Safety: Contaminants and Toxins</b>	<b>3.0; 3 cr.</b>
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.		

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 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.*

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 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.*

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 This course provides the students with 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 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 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.*

## Elective Courses for the MS Degree in Food Safety

- FSEC 300 Food Security: Challenges and Contemporary Debate 3 cr.**  
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