



Faculty of Agricultural and Food Sciences  
Healthy Earth, Healthy Food, Healthy People



Resilient  
Environment



Food  
Security



Nutrition  
for Health

# FAFS Graduate Manual 2015-2016

# **FAFS Graduate Manual** 2015-2016

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## List of Abbreviations

<b>ACC</b>	Animal Care Committee
<b>AGSC</b>	Agricultural Sciences
<b>AVSC</b>	Animal and Veterinary Sciences
<b>CP</b>	Coordinated Program
<b>FAFS</b>	Faculty of Agricultural and Food Sciences
<b>GA</b>	Graduate Assistantship
<b>GNP</b>	Interfaculty Graduate Nutrition Program
<b>GPA</b>	Grade Point Average
<b>GRA</b>	Graduate Research Assistantship
<b>GSC</b>	Graduate Studies Committee
<b>IGESP</b>	Interfaculty Graduate Environmental Sciences Program
<b>IGESPC</b>	Interfaculty Graduate Environmental Sciences Program Committee
<b>IRB</b>	Institutional Review Board
<b>LDEM</b>	Landscape Design and Ecosystem Management
<b>MS</b>	Master of Science
<b>NFSC</b>	Nutrition and Food Sciences

## Letter from the Dean

“Advances in medicine and agriculture have saved vastly more lives than have been lost in all the wars in history.”

Carl Sagan (1934-1996)

Welcome to the Faculty of Agricultural and Food Sciences (FAFS) at the American University of Beirut. Established in 1952, FAFS has continuously educated a growing number of students using a learner-centered approach to meet the needs of a changing world. Over the years our School has addressed through teaching, research, and service, challenges facing rural societies and has tackled issues of global interest related to the food industry, the natural environment, and nutrition, all aiming at enhancing the health and wellbeing of society.

FAFS is organized into three departments that offer outstanding undergraduate and many graduate programs in various disciplines. The departments of Agriculture, Landscape Design and Ecosystem Management, and Nutrition and Food Sciences currently offer seven undergraduate degrees. These are in Agribusiness, Agriculture, Food Science and Management, Landscape Architecture and Diploma of Ingénieur Agricole, Nutrition and Dietetics, and Nutrition and Dietetics-Coordinated Program.

At FAFS, we promote interdisciplinary educational programs and we encourage students to think holistically outside narrow disciplines and seek collaboration and partnership with other Faculties. This is evident in our interfaculty programs and in the collaborative research we conduct. We have two graduate interfaculty programs; a nutrition program leading to an M.Sc. degree in collaboration with the Faculty of Medicine and the Faculty of Health Sciences, and an ecosystem management program leading to an M.Sc. degree in collaboration with the Faculties of Engineering and Architecture, Medicine, Health Sciences, and Arts and Sciences.

Our campus is a green landmark situated in the center of Beirut, overlooking the Mediterranean Sea and encompassing a rich history and legacy. The campus offers excellent facilities for teaching and research, including well-equipped classrooms, design studios, and laboratories. Hands-on experience is integral to all our programs, and we strive to connect our students to out-of-classroom activities that can truly prepare them for their working lives. FAFS has an additional facility, the Agricultural Research and Education Center (AREC) in the Beqa'a valley, where students enrolled in the agriculture science and Landscape Design and Ecosystem Management programs spend their residency requirements. The AREC campus is also used as an advanced Research and Development center serving Lebanon, the Middle East, and North Africa.

I encourage you to browse our Web Site for further information and details.

With Best Regards,

**Nahla Hwalla**

Professor and Dean

Faculty of Agricultural and Food Sciences

## Historical Background

The MS graduate program at FAFS was initiated in 1956. The program aims to offer specialized training in a variety of fields in food and agriculture, and to prepare students for further studies in Europe and North America. The first MS degree in Horticulture was granted in 1958, and the first MS in Food Technology in 1959. Since then, FAFS has kept adapting its graduate programs to meet the needs of an evolving regional demand. An MS in Nutrition was introduced in 1963, and the first degree was granted in 1965. An MS in Ecosystem Management, a major of the interfaculty MS in Environmental Sciences, has been offered since 1997. FAFS currently offers MS specialization in animal science, poultry science, agricultural economics, irrigation, plant protection, plant science, nutrition, food technology, ecosystem management and rural community development.

# Historical Background

## Mission

The mission of FAFS is to foster the sustainable enhancement of the health and well being of people and nature throughout Lebanon and the region. To achieve its goals, the Faculty uses basic and applied research, as well as student-centered learning to prepare leaders and agents of change to address issues of local and global relevance at the nexus of human nutrition, food security and sustainable use of resources.

## Vision

FAFS is the regional academic reference in agriculture, food, nutrition and the environment.

# Mission and Vision

## Graduate Programs

The faculty offers the MS degree, with or without thesis, in the following majors: agricultural economics, animal sciences, food technology, irrigation, nutrition, plant protection, plant science, and poultry science. The faculty also participates in the inter-faculty graduate programs leading to the degrees of MS in Environmental Sciences (major: Ecosystem Management). The faculty also offers an inter-departmental graduate program, hosted by the Environment and Sustainable Development Unit (ESDU), leading to an MS degree in Rural Community Development (RCODE, thesis or non-thesis).

Students following a thesis program are required to take a minimum of 21 graduate level course credits plus a thesis (equivalent to 9 credits). The thesis program may include a maximum of 3 tutorial course credits. Core regular courses should constitute a minimum of 12 credits excluding seminars and tutorials, with graduate elective courses to be determined with the adviser. A student following a non-thesis program is required to take a minimum of 33 graduate level course credits. The program should include a minimum of 3 credits and a maximum of 6 tutorial credits with at least 12 credits being from core courses in the major.

# Graduate Programs

## FAFS Faculty Members/Advisers

**Table 1. List of Faculty Advisers**

Name	Title	Specialty	Office	Ext	e-mail
<b>Agriculture Department</b>					
Abou Jawdah, Yusuf	Professor	Plant Pathology	W.B 504	4483	abujawyf@aub.edu.lb
Bashour, Isam	Professor	Soil	W.B 516	4579	ib02@aub.edu.lb
Farran, Mohammad	Professor	Poultry Science	W.A 321	4450	mf02@aub.edu.lb
Chaaban, Jad	Associate Professor	Agricultural Economics	W.A 311	4442	Jc11@aub.edu.lb
Chalak, Ali	Assistant Professor	Agricultural Economics	W.A 308B	4502	ac22@aub.edu.lb
Haidar, Mustapha	Professor	Weed	W.B 515	4492	mhaidar@aub.edu.lb
Jaafar, Hadi	Assistant Professor	Irrigation	W.B 517A	4501	hj01@aub.edu.lb
Prattis, Suzan M.	Assistant Professor	Veterinary	W.A 305	4451	sp07@aub.edu.lb
Saad, Adib	Professor	Plant Pathology	W.B 508A	4498	saad@aub.edu.lb
<b>Landscape Design and Ecosystem-Management Department</b>					
Abunnasr, Yaser	Assistant Professor	Landscape	W.A 206	4548	ya20@aub.edu.lb
Al-Akl, Nayla	Assistant Professor	Landscape	W.A 212	4457	na143@aub.edu.lb
Farajalla, Nadim	Associate Professor	Irrigation	W.A 131	4409	nf06@aub.edu.lb
Talhok, Salma	Professor	Horticulture	W.A 123	4508/9	ntsalma@aub.edu.lb
Trovato, Maria G.	Assistant Professor	Landscape	W.A 129	4494	mt63@aub.edu.lb
Zurayk, Rami	Professor	Soil	W.A 302	4571/7	rzurayk@aub.edu.lb

# FAFS Faculty Members/Advisers

### Nutrition and Food Sciences Department

Abiad, Mohammad	Assistant Professor	Food Science	W.A 309	4412	ma192@aub.edu.lb
Jomaa, Lamis	Assistant Professor	Nutrition	W.B 405	4544	lj18@aub.edu.lb
Naja, Farah	Associate Professor	Nutrition	W.B 407	4504	fn14@aub.edu.lb
Nasreddine, Lara	Associate Professor	Nutrition	W.B 413	4547	ln10@aub.edu.lb
Obeid, Omar	Professor	Nutrition	W.B 409	4440	oo01@aub.edu.lb
Olabi, Ammar	Associate Professor	Food Science	W.A 315	4500	ao01@aub.edu.lb
Toufeili, Imad	Professor	Food Science	W.A 301	4551	toufeili@aub.edu.lb

W.A: Wing A; W.B: Wing B.

# Admission

## Admission

### A. Application Procedures and Requirements

Application forms for admission to graduate study at FAFS may be obtained from the Office of Admissions at AUB or downloaded from [www.aub.edu.lb/~webadmit/](http://www.aub.edu.lb/~webadmit/).

All applications for admission should be completed on these forms and submitted, along with supporting documents, to the Office of Admissions. In addition to filling out the graduate application, applicants must provide:

- An official transcript covering at least to the end of the first semester of the senior year or its equivalent.
- At least two letters of recommendation from people familiar with their background/qualifications (e.g. professors, supervisors,...).
- A detailed statement of purpose (~400-500 words) for each choice (major or concentration) indicating the purpose for pursuing graduate study in the particular field at AUB, and specifying the applicant's research interests and/or practical experience in the field.

To be considered for admission to the graduate programs at AUB, applicants must hold a bachelor's degree from AUB or its equivalent from a recognized institution of higher learning. Applicants who have a good record of academic achievement, and a potential for creative and independent work, may be admitted to the MS graduate programs.

Applicants who hold degrees from institutions other than AUB must present, along with their official transcript, a letter from the institution awarding the degree indicating the denotation of their grading system in terms of its equivalence on a 4.0 GPA scale, or in terms of letter grades A, B, C with +/- scales. Alternatively, applicants may present an official letter from the Office of the Registrar of their respective institutions indicating the graduating class average of previous years along with standard deviation and class size.

### B. English Language Proficiency Requirement (ELPR)

Applicants to the graduate program, other than AUB graduates and graduates of recognized colleges or universities in North America, Great Britain, Australia, and New Zealand, must meet the English Language Proficiency Requirement (ELPR). This can be done by submitting official test scores for (at least) one of the following tests: English Entrance Examination (EEE), Test of English as a Foreign Language (TOEFL), International English Language Testing System (IELTS), GRE (Verbal Part), GMAT (Verbal Part).

Admitted applicants shall be exempted from taking additional English language courses when they attain a score of 530 on the English Entrance Examination (EEE), or 583 on the paper-based Test of English as a Foreign Language (TOEFL), or 250 on the computer-based TOEFL or 97 on the internet-based TOEFL, or 7.0 on the IELTS, or 147 on the Verbal Part of the GRE or 25 on the Verbal Part of the GMAT.

Applicants may also be admitted with English language proficiency test scores lower than those listed in the above paragraph. In such cases, the applicants will be required to take additional English language courses upon starting their graduate degree programs as indicated below.

Applicants who score between 375 and 499 on the EEE, or between 490 and 570 on the TOEFL (between 163 and 227 on the computer-based TOEFL or 57-87 on the internet-based TOEFL), may join the Intensive English Course (IEC). Students with scores of 375–449 on the EEE or 490–500 on the TOEFL (163–173 on the computer-based TOEFL or 57–61 on the internet-based TOEFL) go into ENGL 100A (15 hrs/week). Those with scores of 450–499 on the EEE or 503–570 on the TOEFL (177–227 on the computer-based TOEFL or 62–87 on the internet-based TOEFL) go into ENGL 100B (10 hrs/week). Students enrolled in the IEC may register for the course in statistics (AGSC 301 or NFSC 301).

Applicants who score between 500 and 529 on the EEE or 573 and 582 on the TOEFL (between 230 and 249 on the computer-based TOEFL or 88-96 on the Internet-based TOEFL) are required to take ENGL 300 during their first semester of registration as graduate students. These students may also register for two graduate courses in their first semester as graduate students.

#### Summer Preparatory English Program

Applicants who score between 475 and 499 on the EEE, or between 550 and 572 on the TOEFL (or between 213 and 229 on the computer-based TOEFL or between 81 and 87 on the internet-based TOEFL), may take UPGR 001 Preparatory English for Graduate Students. Those students need to pass UPGR 001 with an average grade of 70 in order to enroll in their majors (see UPP section page 205 in the Graduate Catalogue).

#### UPGR 001 Preparatory English for Graduate Students

Score on English language proficiency test				
Computer-based TOEFL	Paper-based TOEFL	Internet-based TOEFL	EEE	English language course
213–229	550–572	81–87	475–499	UPGR 001

### C. Deadlines for Admissions

Applications for regular admission to graduate studies should be received by the following dates for consideration in the subsequent semester(s):

- November 2, 2015 for spring admission where applicable.
- February 10, 2016 for summer where applicable or fall admissions
- Applications for admission to graduate studies received between February 10, 2016 and April 1, 2016 will be considered for summer and fall admissions pending

availability of places. The decision will be communicated to the applicant within six weeks of the application deadline and not later than May 27, 2016. Applications received after the April 1, 2016 deadline will not be considered for the fall.

Admission decisions and awards of graduate assistantships are announced at the latest by the following dates:

- December 18, 2015 for spring admission.
- April 7, 2016 for summer and fall admissions on applications received by February 10, 2016
- May 10, 2016 for summer admissions on applications received between February 11, 2016 and April 1, 2016
- May 27, 2016 for fall admissions on applications received between February 11, 2016 and April 1, 2016

## D. Categories for Admission

Eligibility for admission is the same for both the thesis MS and the non-thesis MS options. Applicants will be accepted either to the thesis or non-thesis MS option. The students, for reasons commensurate with specific interests and required training, may change from the non-thesis to the thesis track, and vice versa. Noting that any change is subject to approval by the department supervising the major chosen.

Applicants for graduate studies may be considered for admission in one of three categories:

### 1. Admission as a Regular Student

An applicant is considered for admission as a regular student to a graduate program if s/he meets the following minimum admission requirements:

- An undergraduate average of at least 80 percent (or standardized equivalent from other institutions of higher learning) in the major field of study and a cumulative average of at least 75 percent (or standardized equivalent) for all work done at the undergraduate level leading to a bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning. In the Interfaculty Graduate Environmental Sciences Program (IGESP), an average of at least 80 percent is required for the last two years of undergraduate study or its equivalent at AUB or other universities as determined by the faculty.
- Students holding a minor in a field of specialization with at least 80 percent average, may be considered for admission as regular students in that field.

### 2. Admission on Probation

An applicant is considered for admission on probation if s/he has an undergraduate average of at least 75 percent (or standardized equivalent from other institutions of higher learning) in the major field of study and a cumulative average of at least 75 percent (or standardized equivalent) for all work done at the undergraduate level leading to a

bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning. In the Interfaculty Graduate Environmental Sciences Program (IGESP), an average of 75 percent is required for the last two years of study or its equivalent at AUB or other universities as determined by the faculty.

An applicant who does not meet the above minimum requirement but appears to have reasonable potential for success as a graduate student- as manifested by appropriate practical experience- may be admitted on probation.

A student admitted on probation must complete 9 credits of graduate level courses during the first two semesters of graduate studies, must pass all courses, and must attain a minimum cumulative average of 80 in order to achieve the status of "regular" student. If the student fails to meet any of these conditions, s/he will be dropped from the program. Students admitted on probation are not considered for financial assistantships until they achieve the status of "regular" student.

### 3. Admission as a Prospective Graduate Student

Applicants holding a bachelor's degree in a major field of study other than the one to which they are applying, and who do not have sufficient academic preparation in the field, may be admitted as prospective graduate students provided they complete certain undergraduate course requirements. Guidelines governing such course requirements are presented below.

To be considered for admission as a prospective graduate student, the applicant must have attained an undergraduate average of 75 percent (or standardized equivalent) in all work done at the undergraduate level leading to a bachelor's degree or its equivalent from AUB or any other recognized institution of higher learning.

The following policies relate to undergraduate course requirements for students admitted into the prospective student category:

- Prospective students are normally required to take a minimum of 15 credits of undergraduate courses in the major field of study to which they are applying. In addition, they must achieve an average of at least 80 percent in these courses to be admitted to the graduate program and begin work towards their MS degree.
- Departments may recommend to the FAFS-Graduate Studies Committee (GSC) reducing the 15 credit minimum requirement for prospective students conditional on providing supporting evidence and justification. Students who have taken courses in the intended field of study or in areas considered relevant to the intended field of study by departments, may have their requirements reduced. In considering undergraduate courses as prerequisites towards beginning an MS degree in a field of study, departments may recommend to the GSC to take into account courses in a field of study other than the one strictly defined as relevant. Outstanding work and/or research experience relevant to the intended field of study may (in exceptional

cases) be considered in partial fulfillment of required courses. All recommendations to reduce the requirements below 15 credits require the approval of the GSC of the faculty following departmental justification.

- Departments may recommend to the FAFS-GSC waiving of some course requirements after the student's first semester. This procedure is subject to justification and outstanding performance.
- For undergraduate courses taken prior to acceptance as a prospective student to be considered as part of the 15 credit minimum requirement in the intended field of study, the average grade in these courses should be at least 80 percent or equivalent in other grading systems. For the purpose of change of status (admission after completion of requirements) to regular graduate student, a minimum average of 80 percent will be required in all 15 credits of undergraduate courses in the field (including the ones taken prior to acceptance). If an average of 75-80 percent is attained, the student may have her/his status changed to graduate on probation pending departmental recommendation and approval of the FAFS- GSC.

Prospective graduate students who have completed all undergraduate prerequisite courses except one, may begin taking one graduate course along with the last undergraduate course requirement upon the approval of their department and the University GSC.

In selecting students to the MS program, the FAFS- GSC recognizes other evidence of achievement—whenever present—such as research potential or experience, work experience, publications, or other creative work or scholarly activity. In considering such criteria, the GSC of the faculty will give serious consideration to departmental recommendations for admission in some cases to applicants who do not meet the minimum requirements of the undergraduate grade point average indicated above, but instead have presented clear evidence of creative activity and academic potential. Departments must present to the FAFS-GSC a justification of such admission recommendations. The GSC will review these cases, and will make its final recommendation to the dean on a case-by-case basis.

## Registration Information

## Registration Information

The academic year at AUB is divided into two semesters, fall and spring, followed by a summer session.

### A. Course Registration for New Students

Students can register on the web from home via the internet, from campus public computer labs, or from assigned labs.

To register, students should:

- Go to the AUB webpage, <http://www.aub.edu.lb>
- Select from the student menu, current students
- Select AUB Student Information System (AUBSIS)
- After activation of the pin code by the system, follow instructions.

Web registration information sheets are available at the Office of the Registrar and on the Registrar's Office webpage.

### B. Course Registration for Currently Enrolled Students

All currently enrolled students will register before the end of each semester for the upcoming academic semester. The registrar announces all registration dates via e-mail. ID card renewal stickers for continuing students are available from the Office of the Registrar in College Hall. At the beginning of the semester, the registrar will announce the date and time of distribution.

### C. Registration Tips

Here is what to do in case you face any of these phrases during registration:

- Prerequisite Test Score Error: Take the prerequisite or register the co-requisite course.
- Time Conflict: Select another time or section.
- Closed Section: Means capacity is not available in the selected section.
  - In case no places are available, write your name on the waiting list.
  - If no waiting list is available, check with the FAFS Dean's Office Students' Section for capacity.

### D. Late Registration

Students unable to register at the scheduled time will be permitted to register during a period of no more than five working days after the announced deadline. A late registration fee of \$100 is due in this case.

### E. Cross-Registration

Students Enrolled at AUB Taking Courses at Other Universities

A student studying at the American University of Beirut may be allowed to cross-register

for a course at other recognized institutions provided that all of the following conditions are met:

- The course is required by AUB.
- The course is not offered at AUB during the semester at the end of which the student expects to graduate.
- The course in which the student intends to cross-register is equivalent to a course that AUB offers (the number and title of each of the two equivalent courses should be clearly indicated).
- The chairperson of the department in which the student is majoring confirms to the registrar in a written statement that all of the conditions listed above have been met.
- The registrar authorizes the student to cross-register; and the student submits the authorization to the concerned institution.

### F. Payment of Tuition and Fees

Guidelines for Payment of Fees:

- Bursary students should go in person to the Office of Student Affairs to collect their statements of fees and finalize their registration.
- Fees are paid by certified checks only; checks should be issued to the order of the bank concerned according to the following format: "Pay to the order of (name of bank) Account AUB." The value of the check should be the exact amount shown on the statement of fees.
- Students who are sponsored by foundations and institutions such as the Hariri Foundation, or faculty and staff dependents, graduate assistants, and student staff members (including students with zero or credit balance on their statement of fees) should go in person to the Comptroller's Office (Student Accounts Section) to finalize their registration.
- Once a student has completed registration including payment of fees, no further changes in his/her schedule will be allowed until the Drop and Add period.
- Students wishing to add courses during the Drop and Add period should report to the Student Accounts Section, Comptroller's Office, College Hall, as soon as their courses are registered in order to pay any additional fees that may result from the adjustments they introduced to their schedules.
- Failure to pay the additional fees within a period of fourteen days beginning with the last day of Drop and Add will result in the student's being dropped from the added course(s). The student will still be obliged to pay the fees due including the tuition for the added credits.
- Contracts of graduate assistants should be finalized with the FAFS Dean's Office and sent to the Comptroller's Office before the completion of registration and the issuing of the statement of fees.

## Academic Rules and Regulations

### A. Full-Time Status

Full-time status is defined as the enrollment by the graduate student in a minimum of 9 credit hours during the fall or spring semester.

Full-time and part-time graduate students retain privileges of library, email, and internet access even if not registered in courses in summer sessions on the condition that they have registered in the preceding spring semester.

### B. Full-Time Status for University Graduate Assistants and Graduate Research Assistants

Financial aid covering tuition and stipends in the form of a graduate assistantship (GA) or graduate research assistantship (GRA) is available for students at the graduate level in return for assisting faculty members in teaching and/or research for a specified number of hours per week in an academic department. University graduate assistants receiving financial support will acquire part-time or full-time student status depending on the number of credits registered for and the percent of support as per the table below during the period in which they are receiving such support. GRA stipends and tuition support come from grants, either from the University Research Board (URB) or through external grant support and other sources. They supplement or substitute for the regular graduate assistantships and provide additional tuition or stipend support up to the limit set by the University. Table 2 below also provides definitions for full-time minimum enrollment status for a graduate assistant (GA) or graduate research assistant (GRA) during the fall or spring semester and the summer term. GAs or GRA's whose load is less than 100 percent while registered for less than 9 credits, are considered part-time students.

**Table 2. Full-Time Status of GA and GRA (MS degree level students)**

GA Load (%)	Number of Registered Credits paid by AUB	Teaching Aid Service Hours	GRA Load (%)	Research Service Hours paid from Research Grants	Total GA+GRA Load (100%)
100%	9	20	0%	0	100%
67%	6	14	33%	7	100%
33%	3	7	67%	14	100%
0%	0	0	100%	40	100%
Full-Time Status of GA and GRA for Summer term					
100%	6-9	20	0%	0	100%
50%	3	10	50%	10	100%
0%	0	0	100%	40	100%

# Academic Rules and Regulations

## C. Courses and Grades

Courses taken as part of a student's graduate study program fall into one of two categories: graduate courses or prerequisite courses (undergraduate courses). Each category has different grading systems.

### 1. Graduate Level Courses

The minimum passing grade for a graduate course is 70 for an MS student and 75 for a PhD student.

- The minimum grade for a graduate student enrolled in a graduate course is 55.
- Results of tutorial courses, projects, or theses are reported as Pass (P) or Fail (F).

### 2. Prerequisite Courses

Prerequisite courses are undergraduate courses taken to make up for deficiencies in the student's background.

- Prerequisite courses do not carry graduate credit.
- The minimum passing grade for a prerequisite course is 70.

## D. Attendance Policy

A student who would be absent without excuse for more than one third of the number of sessions in any course may be dropped by the instructor of the course.

## E. Course Loads

Normally, the maximum number of credits that may be taken in a regular semester is 12 credits. The maximum number of credits that may be taken in the summer session is 6 credits. A student who wishes to enroll in more than the maximum number of credits must request the FAFS-GSC authorization.

## F. Auditors

Students who wish to audit courses must secure the approval of the professor teaching the course they wish to audit and should pay fees due to the Comptroller's Office. Auditors are not issued student identity numbers, nor are they provided with university identity cards.

## G. Change of Major within Faculty and Interfaculty Transfer

A student enrolled in a MS degree program at AUB may apply to transfer to another program according to the following procedure:

- Change of major within the same faculty: The student may apply for change of major within the same faculty following the set deadlines for graduate admissions process and seeking the approval of the department to which he/she is planning to join and the approval of the FAFS-GSC.

- Transfer to other faculties/schools within AUB: The student should complete a new application to the desired program following the graduate admissions process and deadlines for consideration and admission in the new major.
- Transfer within an interfaculty program: The student should apply to the relevant interfaculty program committee seeking their approval and the approval of the GSC of the receiving faculty.

## H. Transfer of Credits to a MS Degree Program

Graduate courses taken beyond the bachelor's degree requirements at AUB, or at other recognized institutions, are not transferable for credit toward MS degree requirements, unless the applicant attained a cumulative average of at least 80 in the undergraduate courses taken in the major or the related field of study. Only graduate courses in which the applicant earned an equivalent grade of 80 or above can be transferred. No more than 9 credits are transferable provided they are not credits earned by internship, thesis, or practicum, and that the degree minimum residency requirement is maintained. Approval by the FAFS-GSC is required for all transfers.

## I. Transfer of Credits from One MS Degree to Another

Graduate courses taken at AUB (or at other recognized institutions), in which the applicant earned an equivalent grade of 80 or above, may be transferred to another MS degree at AUB. No more than 9 credits are transferable provided they are not credits earned by internship, thesis or practicum, and that the degree minimum residency requirement is maintained. Approval by the department or the academic unit concerned, and the FAFS-GSC is required for all transfers.

## J. Transfer of Credits to a PhD Degree Program

Graduate courses taken beyond the MS degree requirements at AUB, or at other recognized institutions, are not transferable for credit toward PhD degree requirements, unless the applicant attained a cumulative average of at least 85 in the graduate courses taken in the major field of study. Only courses taken beyond the MS degree requirements in which the applicant earned an equivalent grade of 85 or above can be transferred. No more than six credits are transferable provided they are not credits earned by internship, thesis, or practicum, and that the degree minimum residency requirement is maintained. Approval by the FAFS-GSC and the University Graduate Council is required for all transfers.

## K. Calculation of the Grade Point Average (GPA)

Credits earned at other institutions or at AUB beyond the requirements of the bachelor's degree and transferred to the MS program are not included in the calculation of a student's grade average while pursuing a MS degree. Such courses are reported as pass (P). Transfers of credits earned at the MS level from AUB are not subject to the above limitations; they require, however, the recommendation of the department chair and the approval of the FAFS-GSC.

## L. Leave of Absence

All graduate students are expected to make steady and satisfactory progress toward the completion of degrees. Students who are not enrolled for a period of more than 12 months will be considered to have withdrawn from the program unless they apply for a leave of absence and secure approval of the department, the FAFS-GSC, and University Graduate Council. The leave of absence application can be up to one year at a time. The maximum period of approved leave of absence is two years. An approved leave of absence does not count towards maximum residency. Non-enrollment by the student for one semester without securing leave of absence will count towards maximum residency.

Students who seek to return without having secured leave of absence approval after a non-enrollment period of 12 months, must reapply and will be considered for re-admission following regular AUB application for admission procedures.

If re-admitted into the same graduate program, a graduate student's earlier status as graduate student will count towards maximum residency.

## M. Academic Dishonesty

Plagiarism, falsification of data, cheating, and other forms of academic dishonesty are serious violations of academic integrity and may result in dismissal. Students are expected to be familiar with the various forms of academic dishonesty as explained in the Student Code of Conduct. <http://www.aub.edu.lb/pnp/generaluniversitypolicies/Documents/StudentCodeConduct/StudentCodeConduct.pdf>

## N. Academic Standing of Students Working for a MS Degree

### 1. Good Standing

A graduate student is in good standing when his/her graduate cumulative grade average is 80 or above. A student must be in good standing in order to be awarded a degree.

### 2. Probation and Removal of Probation

The academic performance of the student is first evaluated by the department upon completion of 9 credits of course work after initial enrollment towards the degree; it is then evaluated every semester/term, thereafter.

- Students admitted on probation
  - A student admitted on probation must complete at least 9 credits of graduate level courses within the first two semesters of graduate studies, pass all courses, and attain a minimum cumulative average of 80 to achieve regular status.
  - If the student fails to meet any of these conditions, s/he will be dropped from the program.
- Students placed on probation during regular status residency

- A student is placed on probation if he/she attains a cumulative average of 70 or more, but less than 80 or fails any course taken for graduate credit.
- A student placed on probation due to the average must remove the probation by the end of the following regular semester/term by attainment of a cumulative average of at least 80.
- A student placed on probation due to course failure should retake the course the next time it is offered and pass the course. In case this condition cannot be met, the student, in consultation with the adviser, must petition the FAFS Graduate Studies Committee.

The department or program in which the student is enrolled may recommend probation to the FAFS-GSC even though the student has attained an adequate cumulative average.

The registrar sends change in probationary status of enrolled graduate students to the Dean's Offices of their respective faculties/schools within one week of the start of the semester/term for consideration by the faculty/school. The GSC of the faculty/school issues through its Dean's Office the statement of the change of probation status to the graduate student with copies to the department chair, the student's adviser, and the registrar.

### 3. Dismissal

The FAFS-GSC may dismiss a MS student from graduate study, in consultation with the department/program, if any of the following conditions arise:

- Probation status due to the average is not removed in the semester following the first probation, excluding students admitted on probation.
- The student receives probation for a second time during the degree residency.
- The student attains a cumulative average of less than 70 after completion of 9 credits or fails two courses in one term.
- The student attains a cumulative average of 70 or above, but less than 80, in any term and fails one course in that term. (This rule does not apply to the first term of study.)
- The work of the student is considered to be unsatisfactory in the opinion of the department or program, regardless of the grades obtained.
- The student fails the comprehensive examination twice or the thesis twice.

## O. Requirements for the MS Degree

Students working toward a MS degree must fulfill the minimum requirements described below.

### 1. Course Requirements

- Students following the thesis option are required to complete a minimum of 30 credit hours, of which a minimum of 21 graduate credit hours should be in course work and a minimum of 9 credit hours in thesis work. Normally, a maximum of 3 credit hours may be in tutorial courses.

- Students following the non-thesis MS program are required to take a minimum of 33 graduate credit hours, of which a minimum of 3 credits and a maximum of 6 credits should be tutorial credits.

Students receive credit for graduate level courses only. Students with deficiencies in their undergraduate preparation may be required to take additional course credits, as determined by the department/program concerned.

## 2. Comprehensive Examination Requirements

Students must register and pass a zero-credit comprehensive examination course. An oral comprehensive examination should be taken by students. This exam is usually taken after completing most of the course requirements for the degree. Students are expected to take the oral comprehensive examination one semester before the term/semester in which they expect to graduate. The timing of the oral examination is arranged by the student's supervisory committee. The Pass (P) or Fail (F) grade is reported to the registrar immediately on the date the comprehensive examination is passed any time during the semester.

In general, a comprehensive examination is a test that covers a broad base of material. The purpose of the examination is to assess the student's knowledge and capacities to earn a given graduate degree in the field of specialization. The comprehensive examination may test course knowledge, knowledge of the student's proposed research area, and/or general knowledge in the field. The oral comprehensive examination is administered by the student's supervisory committee.

A student who does not pass the comprehensive examination may take it a second time in the following semester. Students who are unable to pass a program's comprehensive exam twice are dropped from the graduate program. Students who pass the comprehensive exam after one failure will have their initial failure deleted and replaced by the passing comprehensive record showing on their transcript.

## 3. Residence Requirements

To meet the minimum residence requirements for the MS degree, a student must register and be in residence as a graduate student for at least two semesters, one semester and two summers, or four summers.

All requirements for the MS degree must be completed within a period of four years after admission to graduate study. Extension beyond the maximum allowed period of study requires approval from the FAFS-GSC.

## P. Institutional Review Board (IRB)/Animal Care Committee (ACC) Requirements

All students conducting human subject research or animal related research for MS theses or projects, must obtain prior written approval/confirmation or exemption from the Institutional Review Board and/or the Animal Care Committee.

## Q. Academic Advising

All students (thesis and non-thesis options) are advised by the chairperson of the department in their first semester. The chairperson informs students about graduate studies in the department, helps students in identifying courses to take, and assists students intending to follow the thesis track in identifying potential research areas and relevant faculty members.

During their second semester, students should decide on the track (thesis or non-thesis) they intend to follow and select an adviser. Normally, the adviser is from among the full-time professorial faculty of the department/program or from another department/program at the University. In interdisciplinary programs, the adviser is from an appropriate program at the University.

The adviser serves as the chair of the supervisory committee. A student's adviser should be in residence at AUB. Under certain exceptional cases i.e., when an adviser goes on an extended leave of absence and the student is in the final write-up stage of her/his thesis, advisers in absentia will be allowed pending GSC approval.

Advisers may be changed upon the approval of the old adviser, new adviser, chair of the department, and the GSC. Advisers who expect to leave for an extended period of time should arrange to find a suitable replacement to continue advising their students.

## R. Supervisory Committee

The supervisory committee is formed during the student's second semester in attendance, and oversees the student's program of study. It is formed by the adviser and the student in coordination with the chairperson of the department according to the following conditions:

- The committee should normally consist of at least three members from the professorial ranks, including the adviser who serves as the committee's chairperson.
- Normally, at least two members from the professorial ranks of the committee must be members of the student's department. The remaining member(s) can be from other departments at AUB, or from an institution other than AUB inside or outside Lebanon.
- Faculty members from non-professorial ranks may serve on the supervisory committees as additional committee members.
- In case the adviser is from another department at AUB, the chairperson will consult with the chairperson of the department to which the adviser belongs.
- In interdisciplinary programs, the members of committee are drawn from full-time faculty members at AUB.

The thesis research proposal (thesis students) or the tutorial research proposal (non-thesis students) should be formulated by the student in coordination with the adviser. The proposal should be approved by the members of the student's supervisory committee. The approved proposal and the courses to be taken in the MS program should be entered on the program of study form:

<http://www.aub.edu.lb/fafs/StudentResources/Pages/PetitionsandForms.aspx>

The student will submit the program of study, including the expected date of graduation, signed by the adviser and all the members of the supervisory committee to the chairperson of the department. The student should indicate if the proposed research involves human subject research or animal related research, and seek approval/ confirmation or exemption of the Institutional Review Board and/or the Animal Care Committee.

Once approved, the chairperson forwards the program of study to the FAFS- GSC for its approval.

The program of study should be completed by the end of the student's second semester in attendance.

It is the student's responsibility, in coordination with the adviser, to keep members of the supervisory committee informed on the progress of her/his work and seek their input.

## S. Thesis Format

An AUB-approved thesis manual is available on the University Libraries webpage <http://www.aub.edu.lb/ulibraries/Documents/ThesisManual/thesis-manual.pdf>. The manual provides the style guide for all theses prepared by AUB students, and application of its instructions is mandatory for all theses-dependent degrees. Theses not conforming to the publication style outlined in the thesis manual are not accepted by the University.

For all matters not discussed in the Thesis Manual, theses must follow the form and style outlined in the latest edition of K. L. Turabian, *Manual for Writers of Term Papers, Theses, and Dissertations* (University of Chicago Press).

## T. Thesis Defense

A student is not allowed to defend her/his thesis unless s/he has passed the comprehensive examination. In order to defend the thesis, the student must be registered for the thesis in the session in which the student expects to graduate.

The thesis defense is open to the public and must be carried out no later than October 30, March 1, or June 10, for students who wish to graduate at the end of the summer session, the fall, or the spring semester, respectively.

The final draft of the thesis shall be submitted to each member of the thesis committee at least two weeks before the date of the thesis defense. The thesis defense shall be announced at least two weeks in advance. The total time allocated for the thesis defense should allow for answering all questions and should not normally exceed 120 minutes.

The thesis defense session is normally chaired by the thesis adviser and the student will be notified of the final decision by the thesis committee immediately after completion of the thesis committee deliberations.

Pass (P) or Fail (F) is reported for the combined thesis and thesis defense. If Fail (F) is reported, the student may resubmit the thesis and defend it after a period of at least three months. Failure on the second attempt results in discontinuation of the graduate work.

If the thesis work involves human subject research or animal related research, the thesis committee must forward to the department chair a copy of the approval/confirmation or exemption letter of the Institutional Review Board and/or the Animal Care Committee.

## U. Deposit of the Project/Thesis in the Library

After passing the thesis defense examination, the student is required to deposit one hard copy and one soft copy of the thesis saved as PDF (Portable Document Format) file to the Jafet Memorial Library and the Science and Agriculture Library. A library receipt must be delivered to the Office of the Registrar before the student is awarded the degree. The student should sign a release form indicating whether or not the library is authorized to supply copies of the thesis to other libraries or to individuals. The non-authorization option is valid for a period of two years only, after which copies of the thesis are supplied upon request.

**Table 3. Deadline Dates for Approval of Thesis Topic, Thesis Defense, and Thesis Deposit**

For MS Candidates Graduating	Summer 2014-15	Fall 2015-16	Spring 2015-16
Deadline for approval of thesis topic and committee	May 5, 2015	September 23, 2015	December 15, 2015
Deadline for thesis defense	September 16, 2015	February 8, 2016	April 25, 2016
Deadline for thesis deposit at library	September 28, 2015	February 18, 2016	May 3, 2016

## V. MS Degree Graduation Requirements

To be eligible for graduation with a MS degree from the American University of Beirut, a graduate student

- must have attained a cumulative course average of 80 or above.
- must not have been placed on probation at the time the course work is completed.
- must have completed the minimum credit hours of course work designated by the specific program.
- must have passed the oral comprehensive exam.
- must have completed thesis requirements for thesis option degrees.
- must have completed tutorial project requirements for the non-thesis option degrees.
- must have met the residence requirements specified for the MS degree.

## FAFS Awards

### A. Dean Thomas Sutherland Prize for Graduate Excellence

A cash prize of \$1,000 awarded annually at graduation to the MS graduate with the thesis judged best overall for design, research, presentation, and contribution to its field.

In the spring semester, faculty members will be asked by the Student Affairs Committee to submit nominations for this award. Each professor can nominate only one graduate student along with a copy of the thesis, resume/CV and justification for making the nomination. Each thesis is reviewed by two outside reviewers and ranked according to originality, design, research, clarity of presentation, and importance to the field.

### B. Abdul Hadi Debs Endowment Award for Academic Excellence

A maximum \$1,000 award given annually at graduation to a MS graduate with an outstanding academic record, who has demonstrated research capabilities through a paper, project, or thesis deemed by the faculty worthy of publication. The procedure for selecting the recipient of the award is similar to that of the Thomas Sutherland prize.

### C. Dean Nuhad Daghir FAFS Graduate Student Award

Awarded annually at graduation to outstanding graduates, this award is set at \$1,000 and will go to the graduating student with an MS Degree in Animal Science or Poultry Science who succeeded in accumulating the highest average over his/her graduate studies at AUB.

# FAFS Awards

## Graduate Programs

### A. Department of Agriculture (AGRI)

The department offers six graduate programs of study leading to MS degrees in agricultural economics, animal science, irrigation, plant protection, and plant science, and poultry science. The students have the choice of selecting a thesis or non-thesis program.

- Students following the thesis option are required to complete a minimum of 30 credit hours, of which a minimum of 21 graduate credit hours should be in course work and a minimum of 9 credit hours in thesis work. Normally, a maximum of 3 credit hours may be tutorial courses.
- Students following the non-thesis MS program are required to take a minimum of 33 graduate credit hours, of which a minimum of 3 credits and a maximum of 6 credits should be tutorial credits. The research of non-thesis students will be normally more field-oriented with a research report presented instead of a thesis.

#### 1. MS in Agricultural Economics

##### Core courses

**AGSC 301 Statistical Methods in Agriculture 2.3** 3 cr.

An investigation of the statistical techniques needed to design experiments, analyze and interpret agricultural research data. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring.*

**AGSC 325 Production Economics 3.0** 3 cr.

Focuses on the organization of farmers for higher income through improved resource use and competitive position.

**AGSC 376 Resource and Environmental Economics 3.0** 3 cr.

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 377 Economics of Water Resources 3.0** 3 cr.

This course applies the tools of neo-classical microeconomics to water resource planning and management. The primary focus of the course is on water problems within agriculture, but also examines issues related to the water needs of municipal usage, industry, and recreation/environmental purposes.

**AGSC 384 Rural Social Change, Development, and the Environment 3.0** 3cr.

Provides an understanding of economic development and underdevelopment as it relates to environmental degradation, demographic, social, and cultural change, with special application to the economies of the Middle East.

# Graduate Programs

**AGSC 389 Research Methods in Applied Economics 3.0** 3 cr.

Provides an overview of theoretical and applied research methods for the study of agricultural, resource and development economics issues. *Prerequisite: AGSC 301.*

**AGSC 395 Graduate Seminar in Agricultural Science 1.0** 1 cr.**AGSC 396 Comprehensive Exam** 0 cr.**AGSC 399 MS Thesis** 9.0 cr.**2. MS in Animal Science****Core courses****AGSC 301 Statistical Methods in Agriculture 2.3** 3 cr.

An investigation of the statistical techniques needed to design experiments, analyze and interpret agricultural research data. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring.*

**AVSC 304 Preventive Immunology and Patterns of Animal Diseases 3.0** 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 306 Diseases of Livestock 3.0** 3 cr.

Etiology, clinical characteristics, identification, and control of some selected infectious and metabolic diseases of economic impact on animal production.

**AVSC 330 Advanced Livestock Production 3.0** 3 cr.

Recent advances in livestock production practices as related to interactions between animal and milieu with reference to the specific nutritional and climatic conditions of the Middle East.

**AVSC 336 Ruminant Nutrition 3.0** 3 cr.

Recent advances in the nutrition of cattle, sheep, and goats with reference to microbiological aspects of digestion and its relation to practical feeding.

**AVSC 388 Animal Production and Environmental Management 3.0** 3 cr.

Characterizes the impact of extensive and intensive livestock systems on the environmental sustainability of the two systems in terms of technical constraints and feasible corrective environmental management strategies.

**AVSC 395 Graduate Seminar in Animal Science 1.0** 1 cr.**AVSC 396 Comprehensive Exam** 0 cr.**AVSC 399 MS Thesis** 9.0 cr.**Elective courses****AVSC 300A/B/C Graduate Tutorial** 1/2/3 cr.

Directed study.

**AVSC 305 Poultry Diseases 3.0** 3 cr.

Etiology, clinical characteristics, identification, prevention, and control of the major infectious and metabolic diseases of poultry.

**AVSC 307 Poultry Production in Warm Regions 3.0** 3 cr.

Recent advances in poultry production, practices under high temperature conditions with special emphasis on physiology of heat stress in birds as related to housing, management, and feeding. *Prerequisite: AVSC 226.*

**AVSC 329 Advanced Animal Physiology 2.3** 3 cr.

Comparative physiology of domestic animals with special emphasis on digestion, reproduction, lactation, and thermo-regulation. *Prerequisite: AVSC 275 or equivalent.*

**AVSC 334 Advanced Poultry Nutrition 2.3** 3 cr.

Recent developments in poultry nutrition; design and implementation of poultry nutrition experiments. *Prerequisite: AVSC 271.*

**3. MS in Irrigation****Core courses****AGSC 301 Statistical Methods in Agriculture 2.3** 3 cr.

An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring.*

**AGSC 310 Advanced Soil Physics 3.0** 3 cr.

Physical properties of soils in arid, semi-arid, and sub-humid regions; soil-water-plant-atmosphere relationships, plant water extraction, and evapo-transpiration; salt and water flow in soils, soil heat flow, and modeling soil water extraction and evaporation.

**AGSC 326 Surface Irrigation Engineering 3.0** 3 cr.

Principles of design, operation, and evaluation of surface irrigation systems; irrigation field design and field measurement techniques. *Prerequisite: consent of instructor.*

**AGSC 328 Sprinkler and Micro-Irrigation Engineering 3.0** 3 cr.

Fundamentals of design, operation, evaluation, and selection of pressurized irrigation systems; pipeline economics, pump hydraulics, and pumping plant design considerations.

<b>AGSC 395 Special Topics in Agricultural Science 1.0</b>	<b>1 cr.</b>
<b>AGSC 396 Comprehensive Exam</b>	<b>0 cr.</b>
<b>AGSC 399 MS Thesis</b>	<b>9.0 cr.</b>

#### 4. MS in Plant Protection

##### Core courses

<b>AGSC 301 Statistical Methods in Agriculture 2.3</b>	<b>3 cr.</b>
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An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring.*

<b>AGSC 311 Advanced Principles and Methods in Plant Pathology 2.3</b>	<b>3 cr.</b>
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Serological and molecular diagnostic techniques, nucleic acids hybridization, PCR, marker assisted selection, brief review of physiology of host-pathogen relationships, and current methods of research including cloning and transgenic plants. *Prerequisite: AGSC 232 or consent of instructor.*

<b>AGSC 322 Plant Parasitic Fungi and Bacteria 2.3</b>	<b>3 cr.</b>
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Morphology, taxonomy, and identification of fungi and bacteria parasitic on plants. (Emphasis Plant Pathology). *Prerequisite: AGSC 232. Alternate years.*

<b>AGSC 332 Plant-Pest Interactions 3.0</b>	<b>3 cr.</b>
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Principles and factors involved in interactions between pests and their host plants; application of perspectives in chemical ecology to agricultural systems; effect of biotic and abiotic factors on the physiology, adaptation, and survival of pest populations in agro-ecosystems. *Prerequisites: AGSC 221, AGSC 232, and AGSC 284.*

<b>AGSC 388 Integrated Pest Management 3.0</b>	<b>3 cr.</b>
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Principles and concepts of integrated pest management; monitoring and forecasting of pest population, tactics, strategies, and implementations of IPM in the agricultural ecosystems; and environmental, economic, and social implications of IPM. (Emphasis Entomology and Weed Science). *Prerequisites: AGSC 221, AGSC 232, and AGSC 284.*

<b>AGSC 395 Special Topics in Agricultural Science 1.0</b>	<b>1 cr.</b>
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<b>AGSC 396 Comprehensive Exam</b>	<b>0 cr.</b>
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<b>AGSC 399 MS Thesis</b>	<b>9.0 cr.</b>
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##### Elective courses

<b>AGSC 300A/B/C Graduate Tutorial</b>	<b>1/2/3 cr.</b>
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Directed study.

<b>AGSC 307 Advanced Crop 3.0</b>	<b>3 cr.</b>
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Theories and principles of plant growth, development, and responses to the environment, with an integrated approach to understanding crop productivity. *Prerequisites: AGSC 220 and AGSC 231.*

<b>AGSC 319 Advanced Vegetable Production 3.0</b>	<b>3 cr.</b>
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Physiological and genetic control of growth and management of vegetable plants and their products; effects of nutrition, irrigation, and other variables on crop performance and quality of produce; presentation and interpretation of recent research progress in vegetable production.

<b>AGSC 323 Plant Virology 2.3</b>	<b>3 cr.</b>
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Fundamental and practical aspects of plant virology including isolation, characterization, identification, replication, and management of plant pathogenic viruses, including gene silencing and transgenic plants. *Prerequisite: AGSC 232. Alternate years.*

#### 5. MS in Plant Science

##### Core courses

<b>AGSC 301 Statistical Methods in Agriculture 2.3</b>	<b>3 cr.</b>
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An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring.*

*Nine credits are required from the following courses: AGSC 307, AGSC 308, AGSC 310, AGSC 312, AGSC 319, and AGSC 324.*

<b>AGSC 307 Advanced Crop Production 3.0</b>	<b>3 cr.</b>
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Theories and principles of plant growth, development, and responses to the environment, with an integrated approach to understanding crop productivity. *Prerequisites: AGSC 220 and AGSC 231.*

<b>AGSC 308 Plant Tissue Culture and Crop Improvement 2.3</b>	<b>3 cr.</b>
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This course introduces students in the agriculture program to a sound understanding of the applied and scientific basis of micro propagation and in-vitro plant breeding.

<b>AGSC 310 Advanced Soil Physics 3.0</b>	<b>3 cr.</b>
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Physical properties of soils in arid, semi-arid, and sub-humid regions; soil-water-plant-atmosphere relationships, plant water extraction, and evapo-transpiration; salt and water flow in soils, soil heat flow, and modeling soil water extraction and evaporation.

**AGSC 312 Fertilizer Technology and Use 3.0** 3 cr.

Fertilizers in agricultural development, current developments in fertilizer technology, fertigation, and special problems associated with fertilizer use and research methodology in soil fertility. Prerequisite: AGSC 265.

**AGSC 319 Advanced Vegetable Production 3.0** 3 cr.

Physiological and genetic control of growth and management of vegetable plants and their products; effects of nutrition, irrigation, and other variables on crop performance and quality of produce; presentation and interpretation of recent research progress in vegetable production.

**AGSC 324 Methods of Soil and Plant Tissue Analysis 2.3** 3 cr.

Analytical techniques, operation of instruments in plant analysis and in physical, chemical, and mineralogical analysis of soils.

**AGSC 395 Special Topics in Agricultural Science 1.0** 1 cr.**AGSC 396 Comprehensive Exam** 0 cr.**AGSC 399 MS Thesis** 9.0 cr.**Elective courses****AGSC 300A/B/C Graduate Tutorial** 1/2/3 cr.

Directed study.

**AGSC 311 Advanced Principles and Methods in Plant Pathology 2.3** 3 cr.

Serological and molecular diagnostic techniques, nucleic acids hybridization, PCR, marker assisted selection, brief review of physiology of host-pathogen relationships, and current methods of research, including cloning and transgenic plants. *Prerequisite: AGSC 232 or consent of instructor.*

**AGSC 322 Plant Parasitic Fungi and Bacteria 2.3** 3 cr.

Morphology, taxonomy, and identification of fungi and bacteria parasitic on plants. *Prerequisite: AGSC 232. Alternate years.*

**AGSC 323 Plant Virology 2.3** 3 cr.

Fundamental and practical aspects of plant virology including isolation, characterization, identification, replication, and management of plant pathogenic viruses, including gene silencing and transgenic plants. *Prerequisite: AGSC 232. Alternate years.*

**AGSC 332 Plant-Pest Interactions 3.0** 3 cr.

Principles and factors involved in interactions between pests and their host plants; application of perspectives in chemical ecology to agricultural systems; effect of biotic and abiotic factors on the physiology, adaptation, and survival of pest populations in agro-ecosystems. *Prerequisites: AGSC 221, AGSC 232, and AGSC 284.*

**AGSC 388 Integrated Pest Management 3.0** 3 cr.

Principles and concepts of integrated pest management (IPM); monitoring and forecasting of pest population, tactics, strategies, and implementations of IPM in the agricultural ecosystems; and environmental, economic, and social implications of IPM. *Prerequisites: AGSC 221, AGSC 232, and AGSC 284.*

All AGSC graduate courses are electives for all majors upon the approval of the adviser.

**AGSC 300A/B/C Graduate Tutorial** 1/2/3 cr.

Directed study.

**AGSC 302 Scientific Communication 1.2** 2 cr.

The course covers the techniques of developing manuscripts, posters, and oral presentations.

**AGSC 309 Drainage of Agricultural Lands 3.0** 3 cr.

Soil properties, porous media flow, hydraulic conductivity measurement, soil leaching requirements, drainage investigations, and surface and subsurface drainage system design.

**AGSC 316 Ground Water Hydrology 3.0** 3 cr.

Occurrence, storage, distribution, and movement of ground water; confined and unconfined aquifer properties, well-aquifer hydraulics and relationships, and ground water basin management.

**AGSC 317 Surface Water Hydrology 3.0** 3 cr.

Relevant statistical concepts and extreme event distributions, rainfall frequency analysis, rainfall-runoff relationships, unit hydrograph theory, overland flow routing, and stochastic processes in hydrology.

**AGSC 320 Project Planning and Management 3.0** 3 cr.

Project preparation, evaluation, and management. Alternate years.

**AGSC 326 Surface Irrigation Engineering 3.0** 3 cr.

Principles of design, operation, and evaluation of surface irrigation systems; irrigation field design and field measurement techniques. Prerequisite: consent of instructor.

**AGSC 328 Sprinkler and Micro-Irrigation Engineering 3.0** 3 cr.

Fundamentals of design, operation, evaluation, and selection of pressurized irrigation systems; pipeline economics, pump hydraulics, and pumping plant design considerations.

**AGSC 376 Resource and Environmental Economics 3.0** 3 cr.

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.

**6. MS in Poultry Science****Core courses****AGSC 301 Statistical Methods in Agriculture 2.3** 3 cr.

An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring.*

**AVSC 304 Preventive Immunology and Patterns of Animal Diseases 3.0** 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 3.0** 3 cr.

Etiology, clinical characteristics, identification, prevention, and control of the major infectious and metabolic diseases of poultry.

**AVSC 307 Poultry Production in Warm Regions 3.0** 3 cr.

Recent advances in poultry production practices under high temperature conditions with special emphasis on physiology of heat stress in birds as related to housing, management, and feeding. *Prerequisite: AVSC 226.*

**AVSC 334 Advanced Poultry Nutrition 2.3** 3 cr.

Recent developments in poultry nutrition; design and implementation of poultry nutrition experiments. *Prerequisite: AVSC 271.*

**AVSC 388 Animal Production and Environmental Management 3.0** 3 cr.

Characterizes the impact of extensive and intensive livestock systems on the environmental sustainability of the two systems in terms of technical constraints and feasible corrective environmental management strategies.

**AVSC 395 Graduate Seminar in Animal Science 1.0** 1 cr.**AVSC 396 Comprehensive Exam** 0 cr.**AVSC 399 MS Thesis** 9.0 cr.**Elective courses****AVSC 300A/B/C Graduate Tutorial** 1/2/3 cr.

Directed study.

**AVSC 306 Diseases of Livestock 3.0** 3 cr.

Etiology, clinical characteristics, identification, and control of some selected infectious and metabolic diseases of economic impact on animal production.

**AVSC 329 Advanced Animal Physiology 2.3** 3 cr.

Comparative physiology of domestic animals with special emphasis on digestion, reproduction, lactation, and thermo-regulation. *Prerequisite: AVSC 275 or equivalent.*

**AVSC 330 Advanced Livestock Production 3.0** 3 cr.

Recent advances in livestock production practices as related to interactions between animal and milieu with reference to the specific nutritional and climatic conditions of the Middle East.

**AVSC 336 Ruminant Nutrition 3.0** 3 cr.

Recent advances in the nutrition of cattle, sheep and goats with reference to microbiological aspects of digestion and its relation to practical feeding.

**B. Department of Nutrition and Food Sciences**

The department offers two graduate programs of study leading to MS degrees in Nutrition and Food Technology. The students have the choice of selecting a thesis or non-thesis program.

- Students following the thesis option are required to complete a minimum of 30 credit hours, of which a minimum of 21 graduate credit hours should be in course work and a minimum of 9 credit hours in thesis work. Normally, a maximum of 3 credit hours may be tutorial courses.
- Students following the non-thesis MS program are required to take a minimum of 33 graduate credit hours, of which a minimum of 3 credits and a maximum of 6 credits should be tutorial credits. The research of non-thesis students will be normally more field-oriented with a research report presented instead of a thesis.

**1. MS in Food Technology****Core courses (thesis)****AGSC 301 Statistical Methods in Agriculture 2.3** 3 cr.

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. Fall and spring.*

**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.**NFSC 399 MS Thesis** 9 cr.**Core courses (non-thesis)****AGSC 301 Statistical Methods in Agriculture 2.3** 3 cr.

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. Course offered in fall and spring.*

**NFSC 300A/B/C Graduate Tutorial** 1/2/3 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 310 Advanced Food Biochemistry 3.0** 3 cr.

Study of food enzymes, lipid oxidation in food and biological systems, and genetically modified food. *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 (thesis and non-thesis)****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 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. *Prerequisites: 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 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 Technique 1.6** 3 cr.

Principles of animal experiments, analytical techniques, and instrumentation used in nutrition and food science research studies. *Prerequisite: NFSC 267.*

Other elective courses need to be approved by the student's supervisory committee.

**2. MS in Nutrition****Core courses (thesis)****NFSC 301 Statistical Methods for Nutrition and Food Science 2.3** 3 cr.

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. Fall and spring.*

**NFSC 311 Advanced Nutrition, Macro Nutrients 3.0** 3 cr.

Advances in carbohydrate, protein, lipid, fiber and ethanol nutrition 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.**Core courses (non-thesis)****NFSC 300A/B/C Graduate Tutorial** 1/2/3 cr.

Directed study.

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

An intermediate level course of statistics including 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. Fall and spring.*

**NFSC 311 Advanced Nutrition: Macro Nutrients 3.0** 3 cr.

Advances in carbohydrate, protein, lipid, fiber and ethanol nutrition 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.**Elective courses (thesis and non-thesis)****NFSC 300A/B/C Graduate Tutorial** 1/2/3 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; 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 food 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, and 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.

To learn the chemical and physical properties of food ingredients. To apply the product development process from idea generation to marketing. *Prerequisite: NFSC 287.*

### C. The Environment and Sustainable Development Unit (ESDU) Inter-departmental Program in Rural Community Development (RCODE)

The Faculty of Agricultural and Food Sciences offers an inter-departmental graduate program hosted by the Environment and Sustainable Development Unit, leading to the degree of MS in Rural Community Development (RCODE)

ESDU is an inter-disciplinary research and development unit specializing in sustainable rural livelihoods established at the Faculty of Agricultural and Food Sciences to promote collaboration on sustainable development initiatives among departments at AUB and with other institutions and organizations undertaking related activities.

ESDU activities including research, capacity building, and outreach, aim at:

- providing opportunities for faculty and students to work on real-life rural development projects;
- fostering partnerships between research, private and public sectors, and local communities in order to develop community-based solutions; and
- networking with national, regional, and international centers and institutes in the areas of integrated natural resource management and sustainable development.

For more information on ESUDU please refer to [www.ecosystems.org](http://www.ecosystems.org).

The students have the choice of selecting a thesis or non-thesis program.

- Students following the thesis option are required to complete a minimum of 30 credit hours, of which a minimum of 21 graduate credit hours should be in course work and a minimum of 9 credit hours in thesis work. Normally, a maximum of 3 credit hours may be tutorial courses.
- Students following the non-thesis MS program are required to take a minimum of 33 graduate credit hours, of which a minimum of 3 credits and a maximum of 6 credits should be tutorial credits. The research of non-thesis students will be normally more field-oriented with a research report presented instead of a thesis.

### Core courses

**RCOD 341 Rural Community Development, Theory, and Practice 3.0** 3 cr.

Approaches rural community development from a multi-disciplinary perspective and traces the evolution of theory and practice in the field of rural community development. Special attention will be given to integrating theory from various disciplines with the practice of community development. Students are introduced to the concepts of community and community development in general and in the specific context of the Middle East and North Africa (MENA).

**RCOD 342 Qualitative Methods 3.3** 4 cr.

Focuses on the concept of community based development and skills in community mobilization. Examines skills of community analysis, participatory action research, group facilitation, principles of intercultural communication, processes of collaborative planning, and promotion of local initiatives. The lab will offer hands-on experience within the Middle East and North African (MENA) rural communities.

**RCOD 343/AGSC 301 Statistical Methods in Agriculture 2.3** 3 cr.

Provides an investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. Topics include linear regression, analysis of variance, and analysis of covariance with both continuous and categorically coded variables. Introduction to logistic regression and some non-linear models. Surveys will be analyzed using programs like SAS and SPSS. *Prerequisites or instructor's approval: STAT 210 or EDUC 227 and CMPS 209. Fall and spring.*

**RCOD 344 Practicum 3.3** 4 cr.

Through hands-on experience, practicum in rural community development settings -such as projects, development agencies, governmental or non-governmental organizations- prepares students to assume increasing levels of responsibility with competence in these settings. Students will work with the RCODE program director to find a placement in a development agency or organization in Lebanon or abroad. They will work on mutually agreed upon projects under the supervision of a professional practitioner. Internships will be flexible both in duration and expected hours per week.

**RCOD 304 Project/Tutorial 3.0** 3 cr.

Provides the framework within which RCODE students develop their degree projects. During weekly class sessions, students will share elements of their projects (the problem or issue addressed, the procedures employed, outlines, drafts, etc.) for critiques by students and the professor before final presentation. The final project will involve in-depth investigation of an issue.

**RCOD 305 Seminar 0.0** 1 cr.

The course provides a forum for experience exchange and knowledge sharing. Students will present and discuss relevant issues with active and prominent figures in the community development scene in the Middle East and North Africa (MENA).

**RCOD 395 Comprehensive Exam** 0 cr.**RCOD 399 MS Thesis**

Specialization electives, 9 credits for non-thesis option and 6 credits for thesis option: A minimum of three courses need to be selected from the following list for non-thesis option and two courses for thesis option.

**ENSC 630/LDEM 630 Natural Resource Management 3.0** 3 cr.

Ecosystem approach to NRM. Data sources and interpretation for NRM. Physical and socioeconomic, cultural, political, and geographic specificity of NRM. Principles and processes of NRM. Case studies and practical examples in contrasting situations.

**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.*

**AGSC 376 Resource and Environmental Economics 3.0** 3 cr.

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 3.0** 3 cr.

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.

**Free electives, 6 credits.**

AUB faculties and departments offer a wide variety of courses which may serve as electives. A minimum of two courses may be selected from among the following courses or others upon approval of the advisory committee.

**AGSC 389 Research Methods in Applied Economics 3.0** 3 cr.

Provides an overview of theoretical and applied research methods for the study of agricultural, resource, and development economics issues. *Prerequisite: AGSC 301.*

**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.*

**PSPA 343/ENSC 658 Environmental Conflict Resolution 3.0** 3 cr.

An introduction to contemporary approaches in global environmental negotiation, conflict resolution including the efforts of international organizations at risk, communication, mediation, and facilitation. Focuses on procedures to manage negotiations of environmental conflicts and disputes between governments, corporations, ecologists, the media and the general population. Information is also provided on environmental dispute cases successfully resolved. Alternate years.

**EPHD 331 Population Change and Health 3.0** 3 cr.

Population change is central to public health. This course provides a broad introduction to the field of population. It identifies core topics in population, discusses their relation to development and health, and emphasizes measurement issues. Topics covered include population size and growth as they relate to resources and to population health; components of population change including fertility and mortality, their links to development and consequences for health; population composition by age and gender and by socioeconomic status, and related inequalities; and population movements including forced, internal and international migration as factors of population change and health. Special focus is given to the Arab World and the Middle East Region.

**HPCH 332 Community Health and Development 2.0** 2 cr.

Students learn concepts and acquire skills necessary for successful community health promotion and development programs. Students look critically at current trends of community development practices using relevant literature on development and community organization and also investigate alternative approaches necessary to improve community development practices through applications in the field. *Prerequisite: HPCH 310 or consent of instructor.*

## D. Department of Landscape Design and Ecosystem Management (LDEM)

The department offers an MS degree in environmental sciences with specialization in ecosystem management under the auspices of the Interfaculty Graduate Environmental Sciences Program (IGESP).

### Interfaculty Graduate Environmental Sciences Program (IGESP)

The Master of Science degree in environmental sciences is offered with four possible specializations:

- Ecosystem Management in the Faculty of Agricultural and Food Sciences (FAFS)
- Environmental Health in the Faculty of Health Sciences (FHS)
- Environmental Technology in the Faculty of Engineering and Architecture (FEA)
- Environmental Policy Planning in the Faculty of Arts and Sciences (FAS)

The program draws on the resources of various departments of the faculties of Agricultural and Food Sciences (FAFS), Arts and Sciences (FAS), Engineering and Architecture (FEA), Health Sciences (FHS), and Medicine (FM), and provides opportunities for study and research in the general field of the environment.

The program provides graduates with the necessary tools for professional practice and/or the pursuit of higher education. It is administered by an interfaculty committee that coordinates with the graduate committees of the faculties concerned. To be accepted by the program, an applicant must

- meet general university requirements for admission to graduate study, and
- be recommended by the appropriate faculty graduate committee and accepted by the Interfaculty Coordinating Committee of the program.

Applicants to the program may be admitted under the following categories:

- Graduate--if the average in the last 60 credits or the last two years is greater than 80.
- Graduate on probation--if the average in the last 60 credits or the last two years is less than 80 and greater than 75.

Adequate preparation for any graduate course will be undertaken upon the decision of the academic adviser and the Interfaculty Graduate Environmental Sciences Program Committee (IGESPC).

### Degree Requirements

Requirements for the degree of Master of Science in environmental sciences (any specialization), both thesis and non-thesis options, are tabulated below.

Course	Group	Thesis Option Credits	Non-Thesis Option Credits
Core	A	9	9
Electives	B	15	18
Seminar		0	0
Thesis		6	0
Project			3
Total number of credits required for graduation			30

Core courses, as well as basic and broad electives, are listed below. These courses are structured to provide students with a diversified and multi-disciplinary background in environmental sciences. Students must register at the core course offered by their faculty of concentration. Students are also required to select two other supplementary courses from the list of core courses approved by the program. Specific faculty/ department requirements are defined under each respective faculty/department.

Group A	Core Courses in Environmental Sciences	Cr.
ENSC 630/LDEM 630	Natural Resources Management	3
ENSC 640/ENHL 310	Toxicology and Environmental Health Hazards	3
ENSC 650/PSPA 316	International Environmental Policy	3
ENSC 690	Seminar in Environmental Engineering and Sciences	0
<b>One of the following courses offered:</b>		
ENSC 600/CIVE 655	Air Pollution and Control	3
CIVE 552	Waste Management and Treatment	3
CIVE 550	Water Treatment and Laboratory	3
CIVE 551	Wastewater Treatment and Laboratory Environmental	3
CIVE 553	Biotechnology	3
CIVE 654	Environmental Bioremediation	3
Group B	Examples of Concentration Electives	Cr.
<b>1. Ecosystem Management</b>		
ENSC 600/CIVE 655	Air Pollution and Control	3
CIVE 552	Waste Management and Treatment	3
ENSC 631/LDEM 631	Agricultural Pollution and Control	3

ENSC 633/LDEM 633	Ecological Landscape Design and Planning	3
ENSC 622/CIVE 653	Environmental Chemistry and Microbiology	3
ENSC 641/ENHL 312	Occupational Health	3
ENSC 642/ENHL 314	Environmental Management Systems	3
ENSC 652/CIVE 656	Environmental Impact Assessment	3
ENSC 654	Physical and Biological Resources in Terrestrial Ecosystems	3
ENSC 655/AGSC 301	Statistical Methods in Agriculture	3
ECON 333	Energy Economics and Policy	3
ENSC 662/ECON 338	Economics of Natural Resources and the Environment	3
LDEM 300	Directed Study in Ecosystem Management	3
LDEM 301	Urban Greening	3
BIOL 362	Advanced Ecology	3
BIOL 363	Population and Community Ecology	3
AGSC 376	Resource and Environmental Economics	3
AGSC 384	Rural Social Changes Development and Environment	3
CIVE 649	Climate Change and Water Resources	3
CIVE 633	Soil and Site Improvement	3
CIVE 654	Environmental Bioremediation	3
CIVE 655	Air Pollution and Control	3
CIVE 756	Environmental and Water Conflict Management	3
URPL 664	Urban Land Use Planning	3
URPL 665	Development and Planning Policies	3

### Course Descriptions

#### **LDEM 301 Urban Greening** 3 cr.

Focuses on the literal green aspect of urban greening, i.e. plants and how they contribute to improve urban living. Topics covered include urban agriculture, green roofs, walls, facades and corridors, parks and open spaces, urban forestry, and horticulture therapy.

#### **ENSC 630/LDEM 630 Natural Resource Management** 3 cr.

Ecosystem approach to NRM. Data sources and interpretation for NRM. Physical, socio-economic, cultural, political, and geographic specificity of NRM. Principles and processes of NRM. Case studies and practical examples in contrasting situations.

#### **ENSC 631/LDEM 631 Agricultural Pollution and Control** 3 cr.

Fate of agrochemicals in the environment. Effect on terrestrial and aquatic systems. Contamination, monitoring residues, methodologies, and risk assessment models and research. *Annually.*

#### **ENSC 633/LDEM 633/URDS 664 Ecological Landscape Design and Planning** 3 cr.

Introduction to the theory and methodology of ecological landscape design and planning, aims to introduce the holistic approach of landscape ecology and its application in sustainable management of natural and cultural landscape stereo-systems. *Alternate years.*

#### **ENSC 634/LDEM 634 Sustainable Landscape Planning and Management** 3cr.

Introduction to the theory and methodology of sustainable landscape planning, which aims at introducing a holistic approach of sustainable planning on the national level of management, including the legal framework, relevant sector policies and prevailing practices.

#### **ENSC 635/LDEM 635 The Political Ecology of Water** 3 cr.

This course provides an approach to understand water issues bringing together political economy and hydro-geography. The course objective is to introduce students to the modes of use and management of water resources, analyzing the causes of water injustice, revealing power relations and environmental hidden costs. The course is planned to emphasize on the situation of water politics in the Arab region. ENSC 654 Physical and Biological Resources in Terrestrial Ecosystems 3 cr. Physical and biological resources in ecosystems, soils in the ecosystem, soil conservation, water in the ecosystem, water conservation, principles of soil and water chemistry and microbiology, plant and animal biodiversity, collection and conservation of wild plants, preservation of endangered species, plant response to environmental stress. LDEM 300 1-3

#### **ENSC 654 Physical and Biological Resources in Terrestrial Ecosystems** 3 cr.

Physical and biological resources in ecosystems, soils in the ecosystem, soil conservation, water in the ecosystem, water conservation, principles of soil and water chemistry and microbiology, plant and animal biodiversity, collection and conservation of wild plants, preservation of endangered species, plant response to environmental stress.

#### **ENSC 655/AGSC 301 Statistical Methods in Agriculture** 3 cr.

An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. *Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring.*

**AGSC 376 Resource and Environmental Economics** 3 cr.

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.

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.

**LDEM 300** 1-3 cr.

Directed study in ecosystem management.

**ENSC 395 Comprehensive Exam** 0 cr.**ENSC 699 MS Thesis** 6 cr.**E. Food Security Program (FSP)**

The Food Security Program aims to promote food security through education, research, community action, and policy-oriented professional practice. Through its Food Security Program, the Faculty of Agricultural and Food Sciences offers a graduate-level, non-degree diploma in Food Security.

**Curriculum**

The Diploma in Food Security requires completion of five courses for a total of 12 credits.

Diploma in Food Security Courses		Credit Hours
FSEC 300	Food Security: Challenges and Contemporary Debate	3
FSEC 305	Agriculture: Technology, Supply Chains, Sustainability	3
FSEC 310	Nutrition Security: Assessment and Intervention Strategies	3
FSEC 315	Food Policies and their Planning Process	3
FSEC 320	Graduate Seminar in Food Security	0

**Course Descriptions:****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 305 Agriculture: Technology, Supply Chains, Sustainability** 3 cr.

This course provides an understanding of sustainable agricultural production through a value chain approach as it relates to production and productivity, water and soil management, Faculty of Agricultural and Food Sciences (FAFS) 87 Graduate Catalogue 2015–16 technology and post-harvest practices; with special application to the dry lands of the Middle East North Africa region.

**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.

**FSEC 315 Food Policies and their Planning Process** 3 cr.

This course builds knowledge of the food system from local planning and policy and applied economic perspectives. The course familiarizes students with key players and issues related to the practice of food system planning (the process and practice of creating and implementing food policies), how this practice interfaces with the economy, and how to place these issues in a global context.

**FSEC 320 Graduate Seminar in Food Security** 0 cr.

This course provides a forum for exchange of experiences and knowledge sharing. Students will participate in field trips, complete individual tasks and projects related to food security issues in the Middle East North Africa and the broader developing country context, and present and discuss findings.

**American University of Beirut**  
**Faculty of Agricultural and Food Sciences**

Tel: +961 1 343 002 Fax: +961 1 744 460

Website: [www.aub.edu.lb/fafs](http://www.aub.edu.lb/fafs) Email: [fafs@aub.edu.lb](mailto:fafs@aub.edu.lb)