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List of Abbreviations

ACC  Animal Care Committee
AGSC  Agricultural Sciences
AVSC  Animal and Veterinary Sciences
FAFS  Faculty of Agricultural and Food Sciences
GA  Graduate Assistantship
GNP  Interfaculty Graduate Nutrition Program
GPA  Grade Point Average
GRA  Graduate Research Assistantship
GSC  Graduate Studies Committee
IGESP  Interfaculty Graduate Environmental Sciences Program
IGESPC  Interfaculty Graduate Environmental Sciences Program Committee
IRB  Institutional Review Board
LDEM  Landscape Design and Ecosystem Management
NFSC  Nutrition and Food Sciences
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 four departments that offer outstanding undergraduate and many graduate programs in various disciplines. The departments of Agricultural Sciences, Animal and Veterinary Sciences, 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 Design and Eco-Management, Nutrition and Dietetics (BS and CP), and Veterinary Science.

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 MS degree in collaboration with the Faculty of Medicine and the Faculty of Health Sciences, and an ecosystem management program leading to an MS 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 eco-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 website (www.aub.edu/fafs) for further information and details.

With Best Regards,

Nahla Hwalla
Professor and Dean, Faculty of Agricultural and Food Sciences
Historical Background
Historical Background

The Master of Science (MS) graduate program at the Faculty of Agricultural and Food Sciences (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 and ecosystem management.

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 interfaculty graduate programs leading to the degrees of MS in Environmental Sciences (major: Ecosystem Management) and MS in Nutrition.

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 advisor. 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.
**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 the sustainable use of resources.

**Vision**

FAFS is a reference academic center specialized in issues of relevance to the Middle East related to agriculture, food, nutrition and the environment for the enhancement of livelihoods, human health and well-being.
# FAFS Faculty Members

## List of Faculty Advisors

Table 1. List of Faculty Advisors

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Specialty</th>
<th>Office</th>
<th>Ext</th>
<th>e-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agricultural Sciences Dept.</strong></td>
<td></td>
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</tr>
<tr>
<td>Abou Jawdah, Yusuf</td>
<td>Professor</td>
<td>Plant Path.</td>
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<tr>
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<tr>
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</tr>
<tr>
<td><strong>Animal and Veterinary Sciences Dept.</strong></td>
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<tr>
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<tr>
<td><strong>Landscape Design and Ecosystem-Management Dept.</strong></td>
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<tr>
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<tr>
<td><strong>Nutrition and Food Sciences Dept.</strong></td>
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</tr>
</tbody>
</table>

**W.A.:** Wing A; **W.B.:** Wing B.
A. Application Procedures and Requirements

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

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

- An official transcript covering at least 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 also be admitted to the M.Sc. 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).

A score of 550 on the English Entrance Examination (EEE), or 600 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 International English Language Testing System (IELTS), or 500 on the Verbal Part of the Graduate Record Examination (GRE), or 25 on the Verbal Part of the Graduate Management Admission Test (GMAT) is required for admission of new applicants to graduate study, or prospective graduate study, from recognized institutions of higher education.

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 5787- 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 Eng100A. Those with scores of 450–499 on the EEE or 503–567 on the TOEFL (177–227 on the computer-based TOEFL or 62–87 on the Internet-based TOEFL) go into Eng100B. Students enrolled in the IEC may register for the course in statistics (AGSC 301 or NFSC 301).

Applicants who score between 500 and 549 on the EEE or 573 and 599 on the TOEFL (between 230 and 249 on the computer-based TOEFL or 8896- on the internet-based TOEFL) are required take English 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.

C. Deadlines for Admissions

- Applications for regular admission to graduate study should be received by the following dates for consideration in subsequent semester(s):
  - February 20 for Summer or Fall admissions.
  - November 15 for Spring admission.
- Late applications for admission to graduate study received between February 21 and May 1 will be considered for Summer or Fall admissions pending availability of places. Decision will be communicated to the applicant within six weeks of deadline of application and not later than June 30. Applications received after the deadline of May 1 will not be considered for Summer or Fall.
- Admission decisions and awards of graduate assistantships are announced at the latest by the following dates:
  - April 15 for Summer or Fall admissions on applications received by February 20.
  - June 30 for Summer or Fall admissions on late applications received between February 21 and May 1.
  - January 15 to 30 for Spring admission.

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, subject to approval by the department supervising the major chosen.
Applicants for graduate study 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 who hold 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 a “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 assistantship until they achieve the status of a “regular” student.

3. **Admission as a Prospective Graduate Student**

Applicants who hold 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 student who must 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 another 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 and must achieve an average of at least 80 percent in these courses to be admitted to the graduate program and begin work towards their Master’s degree.

- Departments may recommend to the Graduate Studies Committee (GSC) reducing the 15 credits minimum requirements for prospective students subject to the provision of supporting evidence and justification. Students who have taken courses in the intended field of study or in areas judged by departments as relevant to the intended field of study 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 consideration of courses in other than the strictly defined field of study that they consider 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 Faculty GSC waiving of some course requirements after the student’s first semester, subject to justification and outstanding performance.

- For undergraduate courses taken prior to acceptance as prospective student to be considered as part of the 15 credit minimum requirements in the intended field of study, the average grade in these courses should be at least 80 percent 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 Faculty 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 GSC.

In selecting students to the Master’s program, the Faculty 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 Faculty 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

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 sentences during registration:

• Prerequisite Test score Error: Meaning to take the pre-requisite or register the co- requisite course.

Time Conflict: Meaning to select another time or section.

• Closed Section: Meaning capacity is not available in the selected section.
  • In case no places are available, write your name in 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, but subject to a late registration fee of $100.

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, in certified checks only; cheques 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 cheque should be the exact amount shown on the Statement of Fees.

• Students who are sponsored by foundations and institutions such as Hariri Foundation, 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 you have completed your registration including payment of fees, no further changes in your 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’s 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 that 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 Period will result in the student being dropped from the added course(s). The student will still be obliged to pay the due fees including the tuition for the added credits.

• Contracts of Graduate Assistants should be finalized with the Faculty’s 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 graduate assistantship (GA) or graduate research assistantship (GRA) are 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 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 3 below also provides definitions for full-time minimum enrollment status for a graduate assistant (GA) or graduate research assistant (GRA) during fall or spring semester and during summer term. GA’s 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 (master degree level students)

<table>
<thead>
<tr>
<th>GA Load (%)</th>
<th>Number of Registered Credits paid by AUB</th>
<th>Teaching Aid Service Hours</th>
<th>GRA Load (%)</th>
<th>Research Service Hours paid from Research Grants</th>
<th>Total GA+GRA Load (100%)</th>
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<tr>
<td>100%</td>
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Full-time Status of GA and GRA for Summer term

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<th>GA Load (%)</th>
<th>Number of Registered Credits paid by AUB</th>
<th>Teaching Aid Service Hours</th>
<th>GRA Load (%)</th>
<th>Research Service Hours paid from Research Grants</th>
<th>Total GA+GRA Load (100%)</th>
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<tr>
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<td>6-9</td>
<td>20</td>
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<td>40</td>
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</tr>
</tbody>
</table>

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 (Undergraduate courses). Each category has different grading systems.

1. Graduate Level Courses
   - The minimum passing grade for a graduate course is 70 for a Master’s 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 is 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 petition the Faculty GSC to obtain permission.

F. Auditors

Students who wish to audit courses must secure the approval of the professor who is teaching the course that they wish to audit and should pay fees due to the Comptroller’s Office. Auditors are not issued student identity numbers and the University does not provide them with university identity cards.

G. Change of Major within Faculty and Interfaculty Transfer

A student enrolled in a Master’s 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, following the set deadlines for graduate admissions process, for change of major within the same faculty by petitioning the department to which he/she is planning to join and securing its approval and the approval of the Faculty GSC.
Transfer to other Faculties/Schools from within AUB: The student should complete a new application to the desired program following the graduate admissions process and deadlines for consideration for 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 into a Master’s Degree Program

Graduate courses taken beyond the Bachelor's degree requirements at AUB, or at other recognized institutions, are not transferable for credit toward Master's degree requirements, unless the applicant attained a cumulative average of at least 80 in the undergraduate courses taken in the major or 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 degree minimum residency requirement is maintained. Approval by the Faculty GSC is required for all transfers.

I. Transfer of Credits from One Master’s 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 Master's degree at AUB. No more than 9 credits are transferable provided they are not credits earned by internship, thesis or practicum, and degree minimum residency requirement is maintained. Approval by the department or the academic unit concerned, and the Faculty GSC is required for all transfers.

J. Transfer of Credits into a PhD Degree Program

Graduate courses taken beyond the Master's 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 Master's 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 degree minimum residency requirement is maintained. Approval by the Faculty GSC and the 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 degree and transferred into the Master's program are not included in the calculation of a student’s grade average while pursuing a Master's degree. Such courses are reported as pass (P). Transfers of credit earned at the Master's level from AUB are not subject to the above limitations but require the recommendation of the department chair and the approval of Faculty 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, Faculty GSC, and 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 non-enrolment period of 12 months must reapply and will be considered for re-admission following regular AUB application/admission procedures.

If re-admitted into the same graduate program then their 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 Master’s Degree

1. Good Standing

A graduate student is in good standing when his/her graduate grade cumulative 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 and then is evaluated every semester/term, thereafter.

- Students Admitted on Probation
  - A student admitted on probation has to complete at least 9 credits of graduate level courses within the first two semesters of graduate studies, has to pass all courses, and has to 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 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 Faculty/School Graduate Studies Committee.

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

The Registrar sends change in probationary status of enrolled graduate students to their respective Faculties/Schools Dean Offices within one week of the start of the semester/term for consideration by the Faculty/School. The Faculty/School GSC issues through the Dean’s Office the statement of the change of probation status to the graduate student with copies to the department chair, student adviser, and Registrar.

3. Dismissal

The Faculty GSC may dismiss a Master’s student, in consultation with the department/program, from graduate study if any of the following conditions arise:

- Probation status due to 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, and regardless of the grades obtained.
- The student fails the comprehensive examination twice or the thesis defense man twice.

0. Requirements for the Master’s Degree

Students working toward a Master’s 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 of thesis work. Normally, a maximum of 3 credit hours may be tutorial courses.
- Students following the non-thesis Master’s 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 the 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 Master’s 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 Master’s 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 Faculty GSC.

P. Institutional Review Board / Animal Care Committee Requirements

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

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 advisor. Normally, the advisor is from among the full-time professorial faculty of the department/program or from another department/program in the University. In interdisciplinary programs, the advisor is from an appropriate program at the University.

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

Advisors may be changed upon the approval of the old advisor, new advisor, chair of the department and the GSC. Advisors 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. The supervisory committee is formed by the advisor 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 advisor 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 advisor 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 Faculty 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 to 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.


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 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 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

<table>
<thead>
<tr>
<th>For Master’s Candidates Graduation in</th>
<th>Summer</th>
<th>Fall</th>
<th>Spring</th>
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<tbody>
<tr>
<td>Deadline for approval of thesis topic and committee</td>
<td>June 18</td>
<td>September 17</td>
<td>January 14</td>
</tr>
<tr>
<td>Deadline for thesis defense</td>
<td>October 8</td>
<td>January 25</td>
<td>May 17</td>
</tr>
<tr>
<td>Deadline for thesis deposit at library</td>
<td>October 17</td>
<td>February 4</td>
<td>May 27</td>
</tr>
</tbody>
</table>

V. Master’s Degree Graduation Requirements

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

• must have attained a cumulative course average of 80 or above.
• is not placed on probation by 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 Master’s degree.
FAFS Awards

A. Dean Thomas Sutherland Prize for Graduate Excellence

A cash prize of $1,000 awarded annually at graduation to the M.S. 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/C.V. 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 of $1,000 award given annually at graduation to the M.S. graduate with outstanding academic record, and 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’s prize.

C. Dean Nuhad Daghir FAFS Graduate Student Award

A cash prize of $1,000 awarded annually at graduation to the outstanding M.S. graduate from the Department of Animal and Veterinary Sciences who succeeded in attaining the highest average over his/her graduate studies at AUB.
Graduate Programs in FAFS Departments

A. Department of Agricultural Sciences

The department offers 4 graduate programs of study leading to MS degrees in agricultural economics, irrigation, plant protection and plant 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 of thesis work. Normally, a maximum of 3 credit hours may be tutorial courses.
- Students following the non-thesis Master’s 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 Plant Protection

Core Courses for the MS Degree in Plant Protection (Thesis)

AGSC 301 Statistical Methods in Agriculture 2.3
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 & spring.

AGSC 311 Advanced Principles and Methods in Plant Pathology 2.3
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
Morphology, taxonomy, and identification of fungi and bacteria parasitic on plants. Prerequisite: AGSC 232. Alternate years.

AGSC 332 Plant-Pest Interactions 3.0
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.
### Elective Courses for the MS Degree in Plant Protection (Thesis and non-thesis)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>AGSC 300A/B/C</td>
<td>Graduate Tutorial</td>
<td>1/2/3 cr.</td>
</tr>
<tr>
<td>AGSC 307</td>
<td>Advanced Crop 3.0</td>
<td>3 cr.</td>
</tr>
<tr>
<td>AGSC 319</td>
<td>Advanced Vegetable Production 3.0</td>
<td>3 cr.</td>
</tr>
<tr>
<td>AGSC 323</td>
<td>Plant Virology 2.3</td>
<td>3 cr.</td>
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#### Core Courses for the MS Degree in Plant Science (Thesis)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>AGSC 301</td>
<td>Statistical Methods in Agriculture 2.3</td>
<td>3 cr.</td>
</tr>
<tr>
<td>AGSC 307</td>
<td>Advanced Crop Production 3.0</td>
<td>3 cr.</td>
</tr>
<tr>
<td>AGSC 319</td>
<td>Advanced Vegetable Production 3.0</td>
<td>3 cr.</td>
</tr>
<tr>
<td>AGSC 395</td>
<td>Special Topics in Agricultural Science 1.0</td>
<td>1 cr.</td>
</tr>
<tr>
<td>AGSC 396</td>
<td>Comprehensive Exam</td>
<td>0 cr.</td>
</tr>
<tr>
<td>AGSC 399</td>
<td>MS Thesis</td>
<td>9.0 cr.</td>
</tr>
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#### Core Courses for the MS Degree in Plant Science (Non-thesis)

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>AGSC 300A/B/C</td>
<td>Graduate Tutorial</td>
<td>1/2/3 cr.</td>
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<tr>
<td>AGSC 301</td>
<td>Statistical Methods in Agriculture 2.3</td>
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</tr>
<tr>
<td>AGSC 307</td>
<td>Advanced Crop Production 3.0</td>
<td>3 cr.</td>
</tr>
<tr>
<td>AGSC 319</td>
<td>Advanced Vegetable Production 3.0</td>
<td>3 cr.</td>
</tr>
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</table>

**2. MS in Plant Science**

Core Courses for the MS Degree in Plant Science (Thesis)

- **AGSC 301 Statistical Methods in Agriculture 2.3**
  - 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 307 Advanced Crop Production 3.0**
  - 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.

- **AGSC 319 Advanced Vegetable Production 3.0**
  - 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 395 Special Topics in Agricultural Science 1.0**
  - 1 cr.

- **AGSC 396 Comprehensive Exam**
  - 0 cr.

- **AGSC 399 MS Thesis**
  - 9.0 cr.

Core Courses for the MS Degree in Plant Science (Non-thesis)

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

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

- **AGSC 307 Advanced Crop Production 3.0**
  - 3 cr.

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

- **AGSC 395 Special Topics in Agricultural Science 1.0**
  - 1 cr.

- **AGSC 396 Comprehensive Exam**
  - 0 cr.

- **AGSC 399 MS Thesis**
  - 9.0 cr.
and quality of produce; presentation and interpretation of recent research progress in vegetable production.

<table>
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<tr>
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<tbody>
<tr>
<td>AGSC 395</td>
<td>Special Topics in Agricultural Science</td>
<td>1.0</td>
</tr>
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<td>Comprehensive Exam</td>
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</tr>
</tbody>
</table>

**Elective Courses for the MS Degree in Plant Science (Thesis and non-thesis)**

<table>
<thead>
<tr>
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</thead>
<tbody>
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</tr>
<tr>
<td>AGSC 301</td>
<td>Statistical Methods in Agriculture</td>
<td>2.3</td>
</tr>
<tr>
<td>AGSC 302</td>
<td>Plant Parasitic Fungi and Bacteria</td>
<td>3.0</td>
</tr>
<tr>
<td>AGSC 311</td>
<td>Advanced Principles and Methods in Plant Pathology</td>
<td>3.0</td>
</tr>
<tr>
<td>AGSC 312</td>
<td>Plant Virology</td>
<td>3.0</td>
</tr>
<tr>
<td>AGSC 313</td>
<td>Plant Pathology Fundamentals</td>
<td>3.0</td>
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</table>

**3. MS in Agricultural Economics**

**Core Courses for the MS Degree in Agricultural Economics (Thesis)**

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>AGSC 301</td>
<td>Statistical Methods in Agriculture</td>
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</tr>
<tr>
<td>AGSC 302</td>
<td>Resource and Environmental Economics</td>
<td>3.0</td>
</tr>
<tr>
<td>AGSC 303</td>
<td>Rural Social Change, Development &amp; the Environment</td>
<td>3.0</td>
</tr>
<tr>
<td>AGSC 304</td>
<td>Research Methods in Agriculture and Social Sciences</td>
<td>3.0</td>
</tr>
<tr>
<td>AGSC 305</td>
<td>Special Topics in Agricultural Science</td>
<td>1.0</td>
</tr>
<tr>
<td>AGSC 306</td>
<td>Comprehensive Exam</td>
<td>0.0</td>
</tr>
<tr>
<td>AGSC 307</td>
<td>MS Thesis</td>
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</tbody>
</table>

**Core Courses for the MS Degree in Agricultural Economics (Non-thesis)**

<table>
<thead>
<tr>
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<td>AGSC 306</td>
<td>Comprehensive Exam</td>
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</tr>
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<td>AGSC 307</td>
<td>MS Thesis</td>
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</tr>
</tbody>
</table>
### AGSC 376 Resource and Environmental Economics 3.0

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 & the Environment 3.0 3cr.**

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.

**AGSC 389 Research Methods in Agriculture and Social Sciences 3.0 3cr.**

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

**AGSC 395 Special Topics in Agricultural Science 1.0 1 cr.**

**AGSC 396 Comprehensive Exam 0 cr.**

### 4. MS in Irrigation

**Core Courses for the MS Degree in Irrigation (Thesis)**

**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 & 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 evapotranspiration; 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.

**AGSC 395 Special Topics in Agricultural Science 1.0 1 cr.**

**AGSC 396 Comprehensive Exam 0 cr.**

**AGSC 399 MS Thesis 9.0 cr.**

**Core Courses for the MS Degree in Irrigation (Non-thesis)**

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

Directed study

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

AGSC 395 Special Topics in Agricultural Science 1.0  
AGSC 396 Comprehensive Exam 0 cr.

**Elective Courses for the MS Degrees in Agricultural Economics and Irrigation (Thesis and non-thesis)**

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 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 evapotranspiration; 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 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 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 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.

In addition, all AGSC graduate courses are electives to all majors upon the approval of the adviser.
B. Department of Animal and Veterinary Science

The department offers two graduate programs of study leading to MS degrees in animal 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 of thesis work. Normally, a maximum of 3 credit hours may be tutorial courses.
- Students following the non-thesis Master’s 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.

Graduate students in the department may become candidates in the interfaculty program in nutrition by meeting the requirements described on pages 34-35 of this manual.

1. MS in Animal Science

Core Courses for the MS degree in Animal Science (Thesis)

**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 & 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.

Core Courses for the MS degree in Animal Science (Non-thesis)

**AVSC 300A/B/C Graduate Tutorial 1/2/3 cr.**
Directed study

**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 & 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
AVSC 396 Comprehensive Exam 0 cr.

Elective Courses for the MS Degree in Animal Science (Thesis and non-thesis)

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.

2. MS in Poultry Science

Core Courses for the MS degree in Poultry Science (Thesis)

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 334 Advanced Poultry Nutrition 2.3 3 cr.
Recent developments in poultry nutrition; design and implementation of poultry nutrition experiments. Prerequisite: AVSC 271.

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 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.

Core Courses for the MS degree in Poultry Science (Non-thesis)

AVSC 300A/B/C Graduate Tutorial 1/2/3 cr.
Directed study
AGSC 301 Statistical Methods in Agriculture 2.3  
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.

Elective Courses for the MS Degree in Poultry Science (Thesis and non-thesis)

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.
C. Department of Landscape Design and Ecosystem Management

The department offers MS degree in Environmental Sciences with specialization in Ecosystem Management under the auspices of the Interfaculty Graduate Environmental Sciences Program (IGESP).

1. Interfaculty Graduate Environmental Sciences Program

The Interfaculty Graduate Environmental Sciences Program (IGESP) leads to the degree of Master of Science (MS) in Environmental Sciences 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 into the program, an applicant must:

- meet general university requirements for admission to graduate study
- 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 to take any graduate course is decided by 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.

<table>
<thead>
<tr>
<th>Course Group</th>
<th>Core Courses in Environmental Sciences</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Group A</td>
<td>ENSC 630/LDEM 630 Natural Resources Management</td>
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</tr>
<tr>
<td></td>
<td>ENSC 640/ENHL 310 Toxicology and Environmental Health Hazards</td>
<td>3</td>
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<td>ENSC 650/PSPA 316 International Environmental Policy</td>
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<tr>
<td></td>
<td>ENSC 660</td>
<td>Environmental Technology is replaced by one of the following courses:</td>
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<tr>
<td></td>
<td>ENSC 600</td>
<td>Air Pollution and Control I</td>
</tr>
<tr>
<td></td>
<td>ENSC 610</td>
<td>Solid Waste Management I</td>
</tr>
<tr>
<td></td>
<td>ENSC 620</td>
<td>Water and Wastewater Treatment Technology</td>
</tr>
<tr>
<td></td>
<td>ENSC 622</td>
<td>Environmental Chemistry and Microbiology</td>
</tr>
<tr>
<td></td>
<td>ENSC 690*</td>
<td>Seminar in Environmental Sciences</td>
</tr>
</tbody>
</table>

Degree Requirements

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

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<tr>
<td></td>
<td>ENSC 690*</td>
<td>Seminar in Environmental Sciences</td>
</tr>
</tbody>
</table>

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 have to register 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 B Examples of Concentration Electives Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Electives</th>
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<tbody>
<tr>
<td>ENSC 600/CIVE 656</td>
<td>Air Pollution and Control I</td>
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<td>ENSC 601/CIVE 657</td>
<td>Air Pollution and Control II</td>
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<td>ENSC 602/CIVE 751</td>
<td>Air Pollution Modeling</td>
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<td>Solid Waste Management I</td>
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<td>ENSC 611/CIVE 655</td>
<td>Solid Waste Management II</td>
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<td>ENSC 612/CIVE 658</td>
<td>Industrial/Hazardous Waste Management</td>
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<td>Water and Sewage Design</td>
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<td>ENSC 622/CIVE 651</td>
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<td>ENSC 623</td>
<td>Physical, Chemical, and Biological Processes</td>
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<tr>
<td>ENSC 631/LDEM 631</td>
<td>Agricultural Pollution and Control</td>
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<td>ENSC 632</td>
<td>Soil Salinity and Management</td>
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<td>ENSC 633/LDEM 633</td>
<td>Ecological Landscape Design and Planning</td>
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<td>ENSC 641/ENHL 312</td>
<td>Occupational Health</td>
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<td>ENSC 642/ENHL 314</td>
<td>Environmental Management Systems</td>
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<td>ENSC 651/CIVE 650</td>
<td>Methods of Environmental Sampling and Analysis</td>
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<td>ENSC 652/CIVE 659</td>
<td>Environmental Impact Assessment</td>
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<td>ENSC 653/PSPA 306</td>
<td>Research Methods and Techniques</td>
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<td>ENSC 654</td>
<td>Physical and Biological Resources in Terrestrial Ecosystems</td>
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</tr>
<tr>
<td>ENSC 655/AGRL 301</td>
<td>Research Design and Statistical Methods</td>
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<tr>
<td>ENSC 656/PSPA 352</td>
<td>Policy and Administration</td>
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<td>ENSC 657/PSPA 317</td>
<td>Environmental Regulation and Legislative Approaches</td>
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<td>ENSC 658/PSPA 318</td>
<td>Environmental Conflict Resolution</td>
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<tr>
<td>ENSC 659/PSPA 362</td>
<td>Policy Analysis and Program Evaluation for Policy Analysts</td>
<td>3</td>
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<tr>
<td>ENSC 661/BIOL 363</td>
<td>Population and Community Ecology</td>
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<tr>
<td>ENSC 662/ECON 338</td>
<td>Economics of Natural Resources and the Environment</td>
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<tr>
<td>BIOL 390 C</td>
<td>Environmental Biology</td>
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<td>PSPA 300</td>
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<tr>
<td>PSPA 352</td>
<td>Administration and Public Policy</td>
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Master of Science in Environmental Sciences—Suggested Curriculum

Thesis Option Course Credits

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<tr>
<th>Term I Fall</th>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENSC 640</td>
<td>Toxicology and Environmental Health Hazards</td>
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<td>Any one of the following courses</td>
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<tr>
<td>ENSC 600</td>
<td>Air Pollution and Control I</td>
<td>3</td>
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<td>ENSC 610</td>
<td>Solid Waste Management I</td>
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<td>ENSC 620</td>
<td>Water and Wastewater Treatment Technology</td>
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<td>ENSC 622</td>
<td>Environmental Chemistry and Microbiology</td>
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<td>ENSC 690*</td>
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<td>ENSC 69_</td>
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<thead>
<tr>
<th>Term II Spring</th>
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<tr>
<td>ENSC 630/LDEM 630</td>
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<td>ENSC 650</td>
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<tr>
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<tr>
<td>ENSC 600</td>
<td>Air Pollution and Control I</td>
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<td>ENSC 610</td>
<td>Solid Waste Management I</td>
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<td>ENSC 620</td>
<td>Water and Wastewater Treatment Technology</td>
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<td>ENSC 622</td>
<td>Environmental Chemistry and Microbiology</td>
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<td>ENSC 69_</td>
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<table>
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<th>Term III Summer</th>
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<td>ENSC 699</td>
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<td>ENSC 69_</td>
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<td>ENSC 695</td>
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<tr>
<td>I</td>
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<tr>
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<td>ENSC 610 Solid Waste Management I</td>
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<td>ENSC 620 Water and Wastewater Treatment Technology</td>
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<td>ENSC 622 Environmental Chemistry and Microbiology</td>
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<td>ENSC 690* Seminar in Environmental Sciences</td>
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<td>ENSC 69_ Elective</td>
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<tr>
<td>II</td>
<td>ENSC 630/LDEM 630 Natural Resources Management</td>
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<td>ENSC 650 International Environmental Policy</td>
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<td>ENSC 600 Air Pollution and Control I</td>
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<td>III</td>
<td>ENSC 697 Project</td>
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<td>ENSC 695 Comprehensive Exam</td>
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<td>ENSC 697 Project</td>
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**Course Descriptions**

**ENSC 600/ CIVE 656 Air Pollution and Control I**
Introduction to air pollutants, sources, and effects. Emissions estimates, regulations, and monitoring techniques. Particulate matter characterization. Meteorology and atmospheric dispersion. Air pollution control processes. **Prerequisite: CHEM 202 or equivalent. Annually.**

**ENSC 601/ CIVE 657 Air Pollution and Control II** 3 cr.
Process analysis, operational limitations, cost and performance, and evaluation of control process and equipment. Case studies, field visits, and inspection of industrial installations. **Prerequisite: ENSC 600 or consent of instructor. Alternate years.**

**ENSC 602/ CIVE 751 Air Pollution Modeling** 3 cr.
Air pollution meteorology, plume rise. Dispersion and atmospheric chemistry. Meteorological models. Gaussian, statistical, and other special application models. **Prerequisite: ENSC 600 or consent of instructor. Alternate years.**

**ENSC 610/ CIVE 654 Solid Waste Management I** 3 cr.
Nature and effects of solid wastes, including hazardous wastes. Engineering management principles, practices, and techniques for management of solid wastes. Solid waste generation, storage, collection and transport, processing, resource recovery, and disposal. Trip to a local facility. **Annually.**

**ENSC 611/ CIVE 655 Solid Waste Management II** 3 cr.
Design of solid waste disposal schemes, including design reports and literature search on the development of conventional treatment and disposal processes. **Prerequisite: ENSC 610 or consent of instructor. Alternate years.**

**ENSC 612/ CIVE 658 Industrial/ Hazardous Waste Management** 3 cr.
Sources, quantity, and quality of industrial wastes. Basic industrial waste treatment processes. Major industries, types of wastes, and existing treatment practices. Disposal and fate of industrial wastes. **Alternate years.**

**ENSC 620 Water and Wastewater Treatment Technology** 3 cr.
Quality and methods of treatment of water and wastewater. Literature search on the development of conventional treatment processes. **Students who have taken CIVE 086 cannot register for this course. Annually.**

**ENSC 621/ CIVE 653 Water and Sewage Works Design** 3 cr.
Design of wastewater schemes, including design reports and literature search on the development of conventional treatment processes. **Prerequisites: CIVE 076, CIVE 586, and ENSC 620, or consent of instructor. Alternate years.**

**ENSC 622/ CIVE 651 Environmental Chemistry and Microbiology** 3 cr.
in biological processes. Biological water quality indicators. Prerequisites: CHEM 201, BIOL 210, or equivalent. Alternate years.

**ENSC 623 Physical, Chemical, and Biological Processes** 3 cr.
Physical-chemical processes: coagulation, flocculation, softening, iron and manganese removal, sedimentation, sand filtration, chlorination, and principles of desalination. Biological processes: trickling filter, biological disks, activated sludge, and waste stabilization ponds. Sludge treatment. Prerequisites: ENSC 620 and ENSC 622, or consent of instructor. Alternate years.

**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. Offered occasionally.

**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 632 Soil Salinity & Management** 3 cr.
Diagnosis and properties of salt-affected soils; plant growth and salinity. Water quality for irrigation, drainage, reclamation, and management of saline and sodic soils. Alternate years.

**ENSC 633/ LDEM 633 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 sterosystems. Alternate years.

**ENSC 640/ENHL 310 Toxicology & Environmental Health Hazards** 3 cr.
Reviews of the essentials of toxicology: dose response, toxicokinetics (absorption, distribution, metabolic conversion, elimination), and the molecular basis for toxic action, target organ toxicity, mutagenesis, teratogenesis, and carcinogenesis. Selected chemical agents that adversely affect human health are introduced as case studies. Concepts of risk assessment. Annually.

**ENSC 641/ ENHL 312 Occupational Health** 3 cr.

**ENSC 642/ ENHL 314 Environmental Management Systems** 3 cr.
This course provides an overview of the most common international standards for environmental management systems, primarily the International Standards Organization (ISO) harmonized management systems, & its implications for different firms. It provides students with the skills to design, implement & assess such management systems. Though the first part of the course is mainly lecture based, student participation in the form of questions & discussion is always welcomed & encouraged. Critical thinking will be promoted throughout the course. Students will be expected to prepare a technical report on a firm or industry of their choice & to communicate project findings to their colleagues through verbal presentation. Emphasis is placed on solving environmental problems using an integrated approach in order to achieve an optimized management performance. Alternate years.

**ENSC 650 International Environmental Policy** 3 cr.
This course seeks to provide a broad overview of the key concepts, actors, and issues related to global environmental policy. It outlines the evolution of environmental policy in facing global environmental policy, in facing global environmental challenges, and how such policies have become inherently intertwined with government policy, business practice, and international trade. Ethical considerations in relation to the environment are also addressed. Annually.

**ENSC 651 Methods of Environmental Sampling and Analysis** 3 cr.
Theory and practice of sampling techniques and instrumental methods used in environmental sciences and technology, with emphasis on the determination of pollutants in water, air, and soil by modern analytical techniques. Adaptation of procedures to specific environmental matrices through case studies and practical application. Alternate.

**ENSC 652/ CIVE 659 Environmental Impact Assessment** 3 cr.
Theories and procedures of assessing environmental impact. Analysis of the impact of development on various measures of environmental quality. Benefit-cost considerations in environmental impact assessment. Cost of environmental degradation: methodologies and case studies. Prerequisites: ENSC 660, ENSC 610, and ENSC 620, or consent of instructor. Alternate years.

**ENSC 653/ PSPA 306 Research Methods and Techniques** 3 cr.
A course that deals with various methods of data collection and analysis. Specific research methods include both quantitative and qualitative techniques such as experimental, survey, field observation, content analysis, historical/comparative, and evaluation. Offered occasionally.
ENSC 654 Physical and Biological Resources in Terrestrial Ecosystems 3 cr.

ENSC 655/AGRL 301 Research Design and Statistical Methods 3 cr.
Non-experimental observational studies. Survey research instrumentation and analysis. Factorial design and analysis. Model testing and validation. Basic statistical concepts. Regression and correlation analysis. Analysis of variance and co-variance. Chi square and other non-parametric tests. Prerequisite: MATH 208 or equivalent. Alternate years.

ENSC 656/PSPA 352 Policy and Administration 3 cr.
A course that studies policy-making environments as sub-systems of larger social and political contexts. This course compares the way policymakers and administrators in different cultural and socio-economic settings deal with globalization, the nature and substance of politics and administration, and the relations between governmental and non-governmental actors. Alternate years.

ENSC 657/PSPA 317 Environmental Regulation and Legislative Approaches 3 cr.
An introduction to environmental law and contemporary legislative approaches to environmental protection, the rationales, and their effectiveness in achieving prescribed goals. This course is divided into three main modules. The first module will introduce students to the basic principles of International and national environmental law. The second module will cover contemporary European, US and selected developing country approaches to environmental law-making, while the final module will analyze environmental legislative approach taken in the case of Lebanon. Annually.

ENSC 658/PSPA 318 Environmental Conflict Resolution 3 cr.
An introduction to contemporary approaches to global environmental negotiation and conflict resolution, including the efforts of international organizations at risk, communication, mediation, and facilitation. This course 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.

A course that introduces students to a wide array of quantitative techniques and skills used by public managers to analyze policy-related data and problems. This course covers different theoretical and applied frameworks for evaluating policy options, as well as program assessment and improvement. Offered occasionally.

ENSC 661/BIOL 363 Population and Community Ecology 3 cr.
A course that introduces the various models and theories of population dynamics and community structure, and their applications in assessing the complex interactions that occur in natural plant-animal systems as a result of long co-evolution, with emphasis on chemical ecology. Prerequisite: Consent of instructor.

ENSC 662/ECON 338 Economics of Natural Resources and the Environment 3 cr.
An analysis of economic issues regarding the efficient use of natural resources and the management of environmental quality. Annually.

ENSC 690 Seminar in Environmental Sciences 0 cr.
Current research or applied projects are presented by faculty members, students, or invited speakers. Annually.

LDEM 300A/B/C Graduate Tutorial 1/2/3 cr.
Directed Study in Ecosystem Management.

ENSC 695 Comprehensive Exam 0 cr.

ENSC 699 MS Thesis 6 cr.
D. Department of Nutrition and Food Sciences

The department offers two graduate programs of study leading to MS degrees in nutrition and food technology. The MS degree in nutrition is also offered under the Interfaculty Graduate Nutrition Program as described in pages 3435- of this manual. 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 of thesis work. Normally, a maximum of 3 credit hours may be tutorial courses.
- Students following the non-thesis Master’s 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 Nutrition

Core courses for the MS Degree in Nutrition (Thesis)

**NFSC 301 Statistical Methods for Nutrition and Food Science 2.3**
3 cr.
This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; 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 311 Advanced Nutrition: Macro Nutrients 3.0**
3 cr.
Advances in carbohydrate, protein, lipid, fiber and ethanol nutrition and 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 for the MS Degree in Nutrition (Thesis and 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.
This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; critical appraisal of literature; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. **Prerequisites:** STAT 210 or EDUC 227 and CMPS 209. **Course offered in fall and spring.**

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

Core courses for the MS Degree in Nutrition (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.
This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; critical appraisal of literature; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. **Prerequisites:** STAT 210 or EDUC 227 and CMPS 209. **Course offered in fall and spring.**

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Advances in carbohydrate, protein, lipid, fiber and ethanol nutrition and metabolism. **Prerequisite:** NFSC 274.

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3 cr.
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**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.
NFSC 307 Nutritional Epidemiology 3.0  
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. Course offered in fall.

NFSC 308 Advanced Therapeutic Nutrition 3.0  
Advances in nutritional care, metabolic changes, and dietary management of diseases. Prerequisites: NFSC 292 and NFSC 293.

NFSC 310 Advanced Food Biochemistry 3.0  
Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified food. Prerequisite: NFSC 261.

NFSC 312 Sports Nutrition 3.0  
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  
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.

2. MS in Food Technology  
Core courses for the MS Degree in Food Technology (Thesis)  
AGSC 301 Statistical Methods in Agriculture 2.3  
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.

NFSC 305 Sensory Evaluation of Food 3.0  
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  
Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified food. Prerequisite: NFSC 261.

NFSC 351 Food Safety: Contaminants and Toxins 3.0  
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 395 Graduate Seminar in Nutrition and Food Science 1.0  

NFSC 396 Comprehensive Exam  
0 cr.

NFSC 399 MS Thesis  
9 cr.

Core courses for the MS Degree in Food Technology (Non-thesis)  
NFSC 300A/B/C Graduate Tutorial  
1/2/3 cr.  
Directed study

AGSC 301 Statistical Methods in Agriculture 2.3  
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.

NFSC 305 Sensory Evaluation of Food 3.0  
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.
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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<td>NFSC 310</td>
<td>Advanced Food Biochemistry</td>
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<td>Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified food. <em>Prerequisite: NFSC 261.</em></td>
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<tr>
<td>NFSC 351</td>
<td>Food Safety: Contaminants and Toxins</td>
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<td>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.</td>
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<td>NFSC 371</td>
<td>Food Engineering</td>
<td>3</td>
<td>Basic concepts and principles of food engineering and their applications; focus on engineering design and analysis of unit operations common to food processing. <em>Prerequisite: NFSC 291.</em></td>
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<td>NFSC 395</td>
<td>Graduate Seminar in Nutrition and Food Science</td>
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<tr>
<td>NFSC 396</td>
<td>Comprehensive Exam</td>
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<td><strong>Elective Courses for the MS Degree in Food Technology (Thesis and non-thesis)</strong></td>
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<td>NFSC 306</td>
<td>Community Nutrition: Research and Intervention</td>
<td>3</td>
<td>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. <em>Prerequisites: NFSC 221 and 222.</em></td>
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<td>Sports Nutrition</td>
<td>3</td>
<td>Nutritional needs for the various types of athletic performance, and selected ergogenic and ergolytic supplements as related to physical performance. <em>Prerequisite: NFSC 274.</em></td>
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<tr>
<td>NFSC 391</td>
<td>Laboratory Methods in Nutrition and Food Science</td>
<td>1.6</td>
<td>Principles of animal experiments, analytical techniques, and instrumentation used in nutrition and food science research studies. <em>Prerequisite: NFSC 267.</em></td>
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<td>Other elective courses need to be approved by the student’s supervisory committee.</td>
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3. Interfaculty Graduate Nutrition Program

The interfaculty Graduate Nutrition Program (GNP) draws on the resources of various departments of the faculties of Agricultural and Food Sciences, Medicine, and Health Sciences, and provides opportunities for study and research in the general field of nutrition. The involvement of several faculties in this program provides students with a wide range of choices and enables students to specialize in areas of nutrition such as basic nutrition, community nutrition, clinical nutrition, or nutritional biochemistry. Students can register in this program through any of the participating faculties.

The program is administered by an interfaculty coordinating committee and the graduate committees of the participating faculties.

To be accepted into the program, the student must:

- meet general university requirements for admission to graduate study,
- be recommended by the department concerned.

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 of thesis work. Normally, a maximum of 3 credit hours may be tutorial courses.
- Students following the non-thesis Master's 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 for the MS Degree in Nutrition (Thesis)

NFSC 301 Statistical Methods for Nutrition and Food Science 2.3 3 cr.
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Advances in carbohydrate, protein, lipid, fiber and ethanol nutrition and metabolism. Prerequisite: NFSC 274.

NFSC 314 Advanced Nutrition: Minerals 3.0 3 cr.
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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 for the MS Degree in Nutrition (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.
This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; critical appraisal of literature; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Course offered in fall and spring.

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Advanced nutritional, biochemical, and physiological aspects of vitamins and vitamin-like substances in humans. Prerequisite: NFSC 274.

NFSC 396 Comprehensive Exam 0 cr.

NFSC 395 Graduate Seminar in Nutrition and Food Science 1.0 1 cr.
Elective Courses for the MS Degree in Nutrition (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.
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