Department of Agriculture (AGRI)

Chairperson: Hamadeh, Shady
Professor Emeritus: Kawar, Nasri
Professors: Abou Jawdah, Yusuf; Barbour, Elie; Bashour, Isam; Farran, Mohamad; Haidar, Mustapha; Hamadeh, Shady; Saad, Adib
Associate Professor: Chaaban, Jad
Assistant Professors: Chalak, Ali; Jaafar, Hadi; Martiniello, Giuliano; Prattis, Susan
Visiting Assistant Professor: Aoun, Mirella
Associates to the Department: Abou Fakhr, Efat; Tawk, Salwa

Graduate Programs

The graduate study program leading to the MS degree with a thesis or non-thesis option is offered with a specialization in the following areas: Agricultural Economics, Animal Science, Irrigation, Plant Science, Plant Protection, and Poultry Science, preparing them for a productive career in Agricultural Technology, Natural Resources Management, and Agribusiness. In addition, the department is especially qualified and equipped for graduate study and research in the following areas:

- nutrition of livestock and poultry
- diseases of livestock and poultry, including preventive immunology and the epizootiology of diseases
- production of milk, meat, and eggs as related to breeding and feeding

The graduates will then be capable of serving mainly in Lebanon, the Middle East, and/or other regions in the world.

Graduate students in the department may become candidates for a degree in the interfaculty program in nutrition by meeting the requirements described on page 581 of this catalogue.
MS Degree in Agricultural Economics\textsuperscript{1}

Core Courses

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

AGSC 325  
Production Economics  
3.0; 3 cr.  
A course that focuses on the organization of farmers for higher income through improved resource use and competitive position.

AGSC 376  
Resource and Environmental Economics  
3.0; 3 cr.  
A course that addresses and analyzes resource and environmental problems facing today's society, with an emphasis on providing the student with an intensive introduction to the qualitative theory necessary for an effective analysis of resource problems.

AGSC 377  
Economics of Water Resources  
3.0; 3 cr.  
This course applies the tools of neo-classical microeconomics to water resource planning and management. The primary focus of the course is on water problems within agriculture, but also examines issues related to the water needs of municipal usage, industry, and recreation/environmental purposes.

AGSC 384  
Rural Social Change, Development and the Environment  
3.0; 3cr.  
A course that 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 Applied Economics  
3.0; 3cr.  
A course that provides an overview of theoretical and applied research methods for the study of agricultural, resource and development economics issues. Prerequisite: AGSC 301.

AGSC 395  
Graduate Seminar in Agricultural Science  
1.0; 1 cr.

AGSC 300  
Graduate Tutorial  
1–3 cr.  
Directed study.

AGSC 396  
Comprehensive Exam  
0 cr.

AGSC 399  
MS Thesis  
9 cr.

\textsuperscript{1} Students have to take 6 cr. from the above list as core requirements (other than AGSC 301, AGSC 395 and AGSC 399 for thesis and AGSC 300C for non-thesis), and 9 cr. as electives from any of the courses listed for the other AGSC majors, plus 3 cr. as free graduate elective, approved by the advisor.
MS in Animal Science

Core Courses

**AGSC 301  Statistical Methods in Agriculture**  2.3; 3 cr.
An investigation of the statistical techniques needed to design experiments 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 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.
A course that 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 cr.

Elective Courses

**AVSC 300  Graduate Tutorial**  1–3 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.

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1 All graduate students in the POSC and ANML programs should take at least 12 credits of AVSC core courses in addition to AGSC 301.
<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVSC 307</td>
<td>Poultry Production in Warm Regions</td>
<td>3.0</td>
<td>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. <em>Prerequisite: AVSC 226.</em></td>
</tr>
<tr>
<td>AVSC 325</td>
<td>Core Pathology Mechanisms of Disease</td>
<td>3.0</td>
<td>This course will entail study of graduate medical pathological mechanisms of disease found in humans and animals. We will initially review the conceptual building blocks spontaneous disease pathology, followed by defined literature reading – each week we will read, review and present a research article describing a classical or newly emerging disease in humans or animals, and relate it to underlying pathology disease mechanisms. The course will take the structure of a weekly journal club. This is an advanced course that will be most helpful for students who are interested in the natural, animal and medical sciences at both the basic and clinical levels of expression. Students taking the course should be matriculated into graduate or postdoctoral study. Under special circumstances, very advanced undergraduates in the natural, or agricultural, health or clinical sciences can matriculate with the permission of the instructor.</td>
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<tr>
<td>AVSC 329</td>
<td>Advanced Animal Physiology</td>
<td>2.3</td>
<td>Comparative physiology of domestic animals with special emphasis on digestion, reproduction, lactation, and thermo-regulation. <em>Prerequisite: AVSC 275 or equivalent.</em></td>
</tr>
<tr>
<td>AVSC 334</td>
<td>Advanced Poultry Nutrition</td>
<td>2.3</td>
<td>Recent developments in poultry nutrition; design and implementation of poultry nutrition experiments. <em>Prerequisite: AVSC 271.</em></td>
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</tbody>
</table>
MS Degree in Irrigation

Core Courses

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

AGSC 310  Advanced Soil Physics  3.0; 3 cr.
Physical properties of soils in arid, semi-arid, and sub-humid regions; soil-water-plant-atmosphere relationships, plant water extraction, and 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 330  Integrated Water Resources Management  3.0; 3 cr.
Quantitative methods for analyzing water resource problems. Topics covered include the design and management of facilities for river basin development, flood control, water supply, hydropower, and other activities related to water resources. Stochastic and deterministic methods for approaching and analyzing water resources problems, Reservoir sizing, simulation, hydrologic time series analysis and optimization methods.

AGSC 317  Surface and groundwater 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. Occurrence, storage, distribution, and movement of ground water; confined and unconfined aquifer properties, well-aquifer hydraulics and relationships, and ground water basin management.

AGSC 300  Graduate Tutorial  1–3 cr.
Directed study.

AGSC 395  Graduate Seminar in Agricultural Science  1.0; 1 cr.
AGSC 396  Comprehensive Exam  0 cr.
AGSC 399  MS Thesis  9 cr.

1 Students have to take 6 cr. from the above list as core requirements (other than AGSC 301, AGSC 395 and AGSC 399 for thesis and AGSC 300C for non-thesis), and 9 cr. as electives from any of the courses listed for the other AGSC majors, plus 3 cr. as free graduate elective, approved by the advisor.
**MS Degree in Plant Protection**

**Core Courses**

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<tr>
<td>AGSC 301</td>
<td>Statistical Methods in Agriculture</td>
<td>2.3; 3 cr.</td>
<td>Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring.</td>
</tr>
<tr>
<td>AGSC 311</td>
<td>Advanced Principles and Methods in Plant Pathology</td>
<td>2.3; 3 cr.</td>
<td>Prerequisite: AGSC 232 or consent of instructor.</td>
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<tr>
<td>AGSC 322</td>
<td>Plant Parasitic Fungi and Bacteria</td>
<td>2.3; 3cr.</td>
<td>Prerequisite: AGSC 232. Alternate years.</td>
</tr>
<tr>
<td>AGSC 323</td>
<td>Plant Virology</td>
<td>2.3; 3 cr.</td>
<td>Prerequisite: AGSC 232. Alternate years.</td>
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<tr>
<td>AGSC 332</td>
<td>Plant-Pest Interactions</td>
<td>3.0; 3 cr.</td>
<td>Prerequisites: AGSC 221, AGSC 232, and AGSC 284.</td>
</tr>
<tr>
<td>AGSC 388</td>
<td>Integrated Pest Management</td>
<td>3.0; 3 cr.</td>
<td>Prerequisites: AGSC 221, AGSC 232, and AGSC 284.</td>
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1 Students have to take 6 cr. from the above list as core requirements (other than AGSC 301, AGSC 395 and AGSC 399 for thesis and AGSC 390C for non-thesis), and 9 cr. as electives from any of the courses listed for the other AGSC majors, plus 3 cr. as free graduate elective, approved by the advisor.

2 Emphasis Plant Pathology

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

AGSC 388  **Integrated Pest Management**  3.0; 3 cr.
Principles and concepts of integrated pest management; monitoring and forecasting of pest population, tactics, strategies, and implementations of IPM in the agricultural ecosystems; and environmental, economic, and social implications of IPM. **Prerequisites:** AGSC 221, AGSC 232, and AGSC 284.

AGSC 300  **Graduate Tutorial**  1–3 cr.
*Directed Study.*

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

AGSC 396  **Comprehensive Exam**  0 cr.

AGSC 399  **MS Thesis**  9 cr.
MS Degree in Plant Science

Core Courses

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

AGSC 307  **Advanced Crop Production**  3.0; 3 cr.
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 308  **Plant Tissue Culture and Crop Improvement**  2.3; 3 cr.
This course introduces students in the Agriculture program a sound understanding of the applied and scientific basis of micro propagation and *in-vitro* plant breeding.

AGSC 312  **Fertilizer Technology and Use**  3.0; 3 cr.
Fertilizers in agricultural development, current developments in fertilizer technology, fertigation, and special problems associated with fertilizer use and research methodology in soil fertility. *Prerequisite: AGSC 265.*

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

AGSC 324  **Methods of Soil and Plant Tissue Analysis**  2.3; 3 cr.
Analytical techniques, operation of instruments in plant analysis and in physical, chemical, and mineralogical analysis of soils.

AGSC 300  **Graduate Tutorial**  1–3 cr.
*Directed Study.*

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MS in Poultry Science

Core Courses

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