

# Department of Agricultural Science (AGSC)

Chairperson:	Bashour, Isam
Professors:	Abou Jawdah, Youssef; Bashour, Isam; Haidar, Mustafa; Nimah, Musa; Saad, Adib; Sidahmed, Moatasim; Yau, Sui-Kwong
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Lecturers:	<sup>P</sup> Abou-Fakhr Hammad, Efat; <sup>P</sup> Khalil, Youssef; <sup>P</sup> Kharat, Antoine
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The Department of Agricultural Science is to provide a stimulating education and prepare graduates for a productive career in Agricultural technology, Natural resources management, and Agribusiness who are capable of serving mainly Lebanon, the Middle East and other regions of the world.

The department offers also a graduate program leading to the degree Master of Science in different majors. Graduate students are trained to successfully contribute to the research, education, and development of sustainable agricultural production and management in the region.

Specialized graduate courses leading towards the MSc degree will be offered to students wishing to specialize in plant science, plant protection, soils, irrigation, mechanization, and agricultural economics.

The department will introduce new programs pertaining to the new trends in agricultural production technology and agribusiness to graduate students that are more field oriented and well prepared in agricultural engineering and technology.

## Graduate Programs

At the graduate level the department offers the MS degree, with a thesis or non-thesis option, in six majors: Agricultural Economics and Development, Irrigation, Mechanization, Soil Science, Plant Protection and Plant Science. Training is available in these areas.

## MS in Agricultural Economics and Development

### Core Courses for the MS Degree in Agricultural Economics and Development

<b>AGSC 301</b>	<b>Statistical Methods in Agriculture</b>	<b>2.3; 3 cr.</b>
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. <i>Prerequisites: STAT 210 and CMPS 209. Fall and spring.</i>		
<b>AGSC 320</b>	<b>Project Planning and Management</b>	<b>3.0; 3 cr.</b>
Project preparation, evaluation, and management. <i>Alternate years.</i>		
<b>AGSC 374</b>	<b>Operations Research Principles and Application</b>	<b>3.0; 3 cr.</b>
Introduction to different optimization techniques in operations research and their relations to applied problems in different fields of agriculture. <i>Prerequisite: MATH 201.</i>		
<b>AGSC 376</b>	<b>Resource and Environmental Economics</b>	<b>3.0; 3 cr.</b>
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.		
<b>AGSC 395</b>	<b>Graduate Seminar in Agricultural Science</b>	<b>1.0; 1 cr.</b>
<b>AGSC 399</b>	<b>MS Thesis</b>	

## MS in Irrigation

### Core Courses for the MS Degree in Irrigation

<b>AGSC 301</b>	<b>Statistical Methods in Agriculture</b>	<b>2.3; 3 cr.</b>
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. <i>Prerequisites: STAT 210 and CMPS 209. Fall and spring.</i>		
<b>AGSC 310</b>	<b>Advanced Soil Physics</b>	<b>3.0; 3 cr.</b>
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.		
<b>AGSC 326</b>	<b>Surface Irrigation Engineering</b>	<b>3.0; 3 cr.</b>
Principles of design, operation, and evaluation of surface irrigation systems; irrigation field design and field measurement techniques. <i>Prerequisite: consent of instructor.</i>		

**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**      **Graduate Seminar in Agricultural Science**      **1.0; 1 cr.**

**AGSC 399**      **MS Thesis**

## MS in Mechanization

### Core Courses for the MS Degree in Mechanization

<b>AGSC 301</b>	<b>Statistical Methods in Agriculture</b>	<b>2.3; 3 cr.</b>
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. <i>Prerequisites: STAT 210 and CMPS 209. Fall and spring.</i>		
<b>AGSC 370</b>	<b>Materials Handling and Processing</b>	<b>3.0; 3 cr.</b>
Physical properties of agricultural materials; principles and practices in the transporting, conveying, grading, and processing of agricultural materials and products; storage and conditioning of grain and forage; transport and storage of fruits and vegetables.		
<b>AGSC 372</b>	<b>Agricultural Machinery Management</b>	<b>3.0; 3 cr.</b>
Selection, adoption, and economics of agricultural machinery; machine, power, and labor performance; cost determination and management decisions; matching implements and tractors.		
<b>AGSC 375</b>	<b>Soil Mechanics in Tillage and Traction</b>	<b>3.0; 3 cr.</b>
Static and dynamic properties of soils, mechanics of tillage tools, design and analysis of tillage tools, design of traction and transport devices, traction performance and evaluation, and soil-machine systems. <i>Prerequisite: AGSC 226.</i>		
<b>AGSC 395</b>	<b>Graduate Seminar in Agricultural Science</b>	<b>1.0; 1 cr.</b>
<b>AGSC 399</b>	<b>MS Thesis</b>	

## MS in Soil Science

### Core Courses for the MS Degree in Soil Science

<b>AGSC 301</b>	<b>Statistical Methods in Agriculture</b>	<b>2.3; 3 cr.</b>
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. <i>Prerequisites: STAT 210 and CMPS 209. Fall and spring.</i>		
<b>AGSC 310</b>	<b>Advanced Soil Physics</b>	<b>3.0; 3 cr.</b>
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 324 Methods of Soil and Plant Tissue Analysis 2.3; 3 cr.**  
Analytical techniques, operation of instruments in plant analysis and in physical, chemical, and mineralogical analysis of soils.

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

**AGSC 399 MS Thesis**

## MS in Plant Protection

### Core Courses for the MS Degree in Plant Protection

**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 and CMPS 209. Fall and spring.*

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

**AGSC 322<sup>a</sup> Plant Parasitic Fungi and Bacteria 2.3; 3 cr.**  
Morphology, taxonomy, and identification of fungi and bacteria parasitic on plants. *Prerequisite: AGSC 232. Alternate years.*

**AGSC 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<sup>b</sup> 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 395 Special Topics in Agricultural Science 1.0; 1 cr.**

**AGSC 399 MS Thesis**

## Elective Courses for the MS Degree in Plant Protection

**AGSC 300 Graduate Tutorial 1–3 cr.**  
Research or advanced discussion of special problems. *Prerequisite: consent of instructor.*

**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 315 Seed Biology 3.0; 3 cr.**  
Principles and factors involved in the production, harvesting, processing, and certification of seeds for sowing. *Alternate years.*

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

**AGSC 329 Global Issues in Conservation of Plant Genetic Resources 2.0; 2 cr.**  
Analysis and discussion of global issues related to plant conservation and the role of governmental, non-governmental, local, regional, and international organizations.

**AGSC 333 Genetic Resources and Improvement of Agronomic Crops 3.0; 3 cr.**  
Fundamental and practical aspects on genetic resources collection, conservation, evaluation, and utilization; plus application of genetic principles and allied subjects on improvement of agronomic crops.

**AGSC 347 Biological Control of Crop Pests 3.0; 3 cr.**  
History and ecological basis of biological control; introduction, culture, and establishment of natural enemies and their integration with other control methods. *Prerequisites: AGSC 221, AGSC 232, and AGSC 284.*

## MS in Plant Science

### Core Courses for the MS Degree in Plant Science

<b>AGSC 301</b>	<b>Statistical Methods in Agriculture</b>	<b>2.3; 3 cr.</b>
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. <i>Prerequisites: STAT 210 and CMPS 209. Fall and spring.</i>		
<b>AGSC 307</b>	<b>Advanced Crop Production</b>	<b>3.0; 3 cr.</b>
Theories and principles of plant growth, development, and responses to the environment, with an integrated approach to understanding crop productivity. <i>Prerequisites: AGSC 220 and AGSC 231.</i>		
<b>AGSC 319</b>	<b>Advanced Vegetable Production</b>	<b>3.0; 3 cr.</b>
Physiological and genetic control of growth and management of vegetable plants and their products; effects of nutrition, irrigation, and other variables on crop performance and quality of produce; presentation and interpretation of recent research progress in vegetable production.		
<b>AGSC 329</b>	<b>Global Issues in Conservation of Plant Genetic Resources</b>	<b>2.0; 2 cr.</b>
Analysis and discussion of global issues related to plant conservation and the role of governmental, non-governmental, local, regional, and international organizations.		
<b>AGRC 395</b>	<b>Special Topics in Agricultural Science</b>	<b>1.0; 1 cr.</b>
<b>AGSC 399</b>	<b>MS Thesis</b>	

### Elective Courses for the MS Degree in Plant Science

<b>AGSC 300</b>	<b>Graduate Tutorial</b>	<b>1–3 cr.</b>
Research or advanced discussion of special problems. <i>Prerequisite: consent of instructor.</i>		
<b>AGSC 311</b>	<b>Advanced Principles and Methods in Plant Pathology</b>	<b>2.3; 3 cr.</b>
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. <i>Prerequisite: AGSC 232 or consent of instructor.</i>		
<b>AGSC 315</b>	<b>Seed Biology</b>	<b>3.0; 3 cr.</b>
Principles and factors involved in the production, harvesting, processing, and certification of seeds for sowing. <i>Alternate years.</i>		
<b>AGSC 322</b>	<b>Plant Parasitic Fungi and Bacteria</b>	<b>2.3; 3 cr.</b>
Morphology, taxonomy, and identification of fungi and bacteria parasitic on plants. <i>Prerequisite: AGSC 232. Alternate years.</i>		
<b>AGSC 323</b>	<b>Plant Virology</b>	<b>2.3; 3 cr.</b>
Fundamental and practical aspects of plant virology including isolation, characterization, identification replication, and management of plant pathogenic viruses, including gene silencing and transgenic plants. <i>Prerequisite: AGSC 232. Alternate years.</i>		

<b>AGSC 333</b>	<b>Genetic Resources and Improvement of Agronomic Crops</b>	<b>3.0; 3 cr.</b>
Fundamental and practical aspects on genetic resources collection, conservation, evaluation, and utilization; plus application of genetic principles and allied subjects on improvement of agronomic crops.		

<b>AGSC 347</b>	<b>Biological Control of Crop Pests</b>	<b>3.0; 3 cr.</b>
History and ecological basis of biological control; introduction, culture, and establishment of natural enemies and their integration with other control methods. <i>Prerequisites: AGSC 221, AGSC 232, and AGSC 284.</i>		

<b>AGSC 332</b>	<b>Plant-Pest Interactions</b>	<b>3.0; 3 cr.</b>
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. <i>Prerequisites: AGSC 221, AGSC 232, and AGSC 284.</i>		

<b>AGSC 388</b>	<b>Integrated Pest Management</b>	<b>3.0; 3 cr.</b>
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. <i>Prerequisites: AGSC 221, AGSC 232, and AGSC 284.</i>		

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

<b>AGSC 300</b>	<b>Graduate Tutorial</b>	<b>1-3 cr.</b>
Special topics in land and water resources.		

<b>AGSC 302</b>	<b>Scientific Communication</b>	<b>1.2; 2 cr.</b>
The course covers the techniques of developing manuscripts, posters, and oral presentations.		

<b>AGSC 309</b>	<b>Drainage of Agricultural Lands</b>	<b>3.0; 3 cr.</b>
Soil properties, porous media flow, hydraulic conductivity measurement, soil leaching requirements, drainage investigations, and surface and subsurface drainage system design.		

<b>AGSC 310</b>	<b>Advanced Soil Physics</b>	<b>3.0; 3 cr.</b>
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.		

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

- 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 318 Soil Salinity and Management 3.0; 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.
- AGSC 320 Project Planning and Management 3.0; 3 cr.**  
Project preparation, evaluation, and management. *Alternate years.*
- AGSC 321 Systems Analysis in Water Resources 3.0; 3 cr.**  
Basic concepts of formulation and modeling of simulation and optimization techniques in water resources; planning and operation of single and multi-reservoir systems; multi-basin river system simulation and management.
- 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 325 Farmer Cooperatives and Credit 3.0; 3 cr.**  
Focuses on the organization of farmers for higher income through improved resource use and competitive position. *Alternate years.*
- AGSC 326 Surface Irrigation Engineering 3.0; 3 cr.**  
Principles of design, operation, and evaluation of surface irrigation systems; irrigation field design and field measurement techniques. *Prerequisite: consent of instructor.*
- AGSC 328 Sprinkler and Micro-Irrigation Engineering 3.0; 3 cr.**  
Fundamentals of design, operation, evaluation, and selection of pressurized irrigation systems; pipeline economics, pump hydraulics, and pumping plant design considerations.
- AGSC 367 Soils Conservation 3.0; 3 cr.**  
Mechanics and control of wind and water erosion of cultivated, range, and forest land; emphasis on land degradation and conservation problems of arid and semi-arid regions.
- AGSC 370 Materials Handling and Processing 3.0; 3 cr.**  
Physical properties of agricultural materials; principles and practices in the transporting, conveying, grading, and processing of agricultural materials and products; storage and conditioning of grain and forage; transport and storage of fruits and vegetables.
- AGSC 372 Agricultural Machinery Management 3.0; 3 cr.**  
Selection, adoption, and economics of agricultural machinery; machine, power, and labor performance; cost determination and management decisions; matching implements and tractors.

- AGSC 374 Operations Research Principles and Application 3.0; 3 cr.**  
Introduction to different optimization techniques in operations research and their relations to applied problems in different fields of agriculture. *Prerequisite: MATH 201.*
- AGSC 375 Soil Mechanics in Tillage and Traction 3.0; 3 cr.**  
Static and dynamic properties of soils, mechanics of tillage tools, design and analysis of tillage tools, design of traction and transport devices, traction performance and evaluation, and soil-machine systems. *Prerequisite: AGSC 226.*
- 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.