MASTER OF SCIENCE (M.S.)
MAJOR IN INTEGRATED
AGRICULTURAL SCIENCES
(THESIS OPTION)

Based on a multidisciplinary approach, the Master of Science (M.S.) degree with a major in integrated Agricultural Sciences will expose students to the breadth of agriculture, and provide opportunities for them to integrate what they learn across different courses. Students will be able to enhance their depth of knowledge in the focus area of their choice: agricultural business, economics and policy; agricultural education; animal science; or crop and soil science. Graduates will develop a 21st century expertise with theoretical and practical skills necessary to analyze, optimize, and apply their knowledge to complex agro-systems. The rigorous interdisciplinary agriculture curriculum will provide exposure to real-world applications, for students to develop technical and leadership skills necessary for an effective career in addressing and solving food and agricultural issues. Each student’s degree will culminate in either thesis-based research or in a non-thesis professional paper.

Application Requirements

The items listed below are required for admission consideration for applicable semesters of entry during the current academic year. Submission instructions, additional details, and changes to admission requirements for semesters other than the current academic year can be found on The Graduate College’s website (http://www.gradcollege.txstate.edu). International students should review the International Admission Documents webpage (http://mycatalog.txstate.edu/graduate/admission-documents/international) for additional requirements.

• completed online application
• $55 nonrefundable application fee
  or
• $90 nonrefundable application fee for applications with international credentials
• baccalaureate degree in agriculture, biology, chemistry, economics, education, or a closely related field from a regionally accredited university
• official transcripts from each institution where course credit was granted
• minimum 3.0 GPA in the last 60 hours of undergraduate course work (plus any completed graduate courses)
• official GRE (general test only) with competitive scores in the verbal reasoning and quantitative reasoning sections
  • The GRE may be waived if the student holds a master’s or doctoral degree from a regionally accredited U.S. institution. If the student holds a master’s or doctoral degree (or the equivalent thereof) from an accredited international institution, the GRE may be waived on an individual basis.
• resume/CV detailing prior work experience, research experience, awards, scholarships, and other related qualifications
• statement of interest (two-page maximum) including research interests, plans for graduate study, and professional aspirations and describing how the student’s scholarly interests and relevant skills can be utilized in the program to pursue those goals
• three letters of recommendation from non-related individuals familiar with the student’s scholarly work and/or relevant work experience

TOEFL or IELTS Scores

Non-native English speakers who do not qualify for an English proficiency waiver:

• official TOEFL iBT scores required with a 78 overall and minimum individual module scores of
  • 19 listening
  • 19 reading
  • 19 speaking
  • 18 writing
• official IELTS (academic) scores required with a 6.5 overall and
  • minimum individual module scores of 6.0

This program does not offer admission if the scores above are not met.

Degree Requirements

The Master of Science (M.S.) degree with a major in Integrated Agricultural Sciences requires 36 semester credit hours, including a thesis. The major and supportive courses are to be taken with the advice and consent of the student’s advisory committee, which consists of three or more faculty selected in consultation with the graduate advisor.

Non-credit (leveling) course work may be required prior to admission into the program if the student lacks sufficient background course work. Any required leveling course work must be completed with grades of B or better prior to admission.

Course Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>AG 5300</td>
<td>Applied Statistics and Econometrics for Agriculture</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 5376</td>
<td>Analysis of Variance</td>
<td></td>
</tr>
<tr>
<td>AG 5301</td>
<td>Agricultural Development and Policy</td>
<td>3</td>
</tr>
<tr>
<td>AG 5310</td>
<td>Research Methods in Integrated Agricultural Sciences</td>
<td>3</td>
</tr>
<tr>
<td>AG 5324</td>
<td>Agroecology and Integrated Agriculture</td>
<td>3</td>
</tr>
<tr>
<td>AG 5350</td>
<td>Foundations of Ethics and Leadership in Agriculture</td>
<td>3</td>
</tr>
<tr>
<td>AG 5365</td>
<td>The Role of Animal Science in Society: An Integrated Approach</td>
<td>3</td>
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</tbody>
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Electives

Choose 12 hours from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>AG 5101</td>
<td>Research Experience</td>
</tr>
</tbody>
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Agricultural Business, Economic and Policy Research Area:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>AG 5302</td>
<td>Economics of Agricultural Production</td>
</tr>
<tr>
<td>AG 5303</td>
<td>Agricultural Marketing and Price Analysis</td>
</tr>
<tr>
<td>AG 5304</td>
<td>Economics of Sustainable Natural Resource Management</td>
</tr>
<tr>
<td>QMST 5335</td>
<td>Forecasting and Simulation</td>
</tr>
</tbody>
</table>

Crops and Soils Research Area:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>AG 5120</td>
<td>Aquaponic Internship</td>
</tr>
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</table>
The IRB approval letter should be included with the proposal form. If Board prior to submitting the proposal form to The Graduate College. If the thesis research involves human subjects, the student must submit the thesis proposal in a timely fashion may result in delayed graduation.

Thesis Committee
The thesis committee must be composed of a minimum of three approved graduate faculty members.

Thesis Enrollment and Credit
The completion of a minimum of six hours of thesis enrollment is required. For a student's initial thesis course enrollment, the student will need to register for thesis course number 5399A. After that, the student will enroll in thesis B courses, in each subsequent semester until the thesis is completed. Failure to register for the thesis course during a term in which supervision and/or are using university resources related to their thesis work. The number of thesis credit hours students enroll in must reflect the amount of work being done on the thesis that semester. It is the responsibility of the committee chair to ensure that students are making adequate progress toward their degree throughout the thesis process. Failure to register for the thesis course during a term in which supervision is received may result in postponement of graduation. After initial enrollment in 5399A, the student will continue to enroll in a thesis B course as long as it takes to complete the thesis. Thesis projects are by definition original and individualized projects. As such, depending on the topic, methodology, and other factors, some projects may take longer than others to complete. If the thesis requires work beyond the minimum number of thesis credits needed for the degree, the student may enroll in additional thesis credits at the committee chair's discretion. In the rare case when a student has not previously enrolled in thesis and plans to work on and complete the thesis in one term, the student will enroll in both 5399A and 5399B.

Students must be enrolled in thesis credits if they are receiving supervision and/or are using university resources related to their thesis work. The only grades assigned for thesis courses are PR (progress), CR (credit), W (withdrew), and F (failing). If acceptable progress is not being made in a thesis course, the instructor may issue a grade of F. If acceptable progress is not being made in a thesis course, the instructor may issue a grade of F. If the student is making acceptable progress, a grade of PR is assigned until the thesis is completed. The completion of a minimum of six hours of thesis enrollment is required. For a student’s initial thesis course enrollment, the student will need to register for thesis course number 5399A. After that, the student will enroll in thesis B courses, in each subsequent semester until the thesis is completed. Failure to register for the thesis course during a term in which supervision and/or are using university resources related to their thesis work. The number of thesis credit hours students enroll in must reflect the amount of work being done on the thesis that semester. It is the responsibility of the committee chair to ensure that students are making adequate progress toward their degree throughout the thesis process. Failure to register for the thesis course during a term in which supervision is received may result in postponement of graduation. After initial enrollment in 5399A, the student will continue to enroll in a thesis B course as long as it takes to complete the thesis. Thesis projects are by definition original and individualized projects. As such, depending on the topic, methodology, and other factors, some projects may take longer than others to complete. If the thesis requires work beyond the minimum number of thesis credits needed for the degree, the student may enroll in additional thesis credits at the committee chair’s discretion. In the rare case when a student has not previously enrolled in thesis and plans to work on and complete the thesis in one term, the student will enroll in both 5399A and 5399B.

The only grades assigned for thesis courses are PR (progress), CR (credit), W (withdrew), and F (failing). If acceptable progress is not being made in a thesis course, the instructor may issue a grade of F. If the student is making acceptable progress, a grade of PR is assigned until the thesis is completed. The minimum number of hours of thesis credit (“CR”) will be awarded only after the thesis has been both approved by The Graduate College and released to Alkek Library.

A student who has selected the thesis option must be registered for the thesis course during the term or Summer I (during the summer, the thesis course runs ten weeks for both sessions) in which the degree will be conferred.

Thesis Deadlines and Approval Process
Thesis deadlines are posted on The Graduate College website under "Current Students." The completed thesis must be submitted to the chair of the thesis committee on or before the deadlines listed on The Graduate College website.

The following must be submitted to The Graduate College by the thesis deadline listed on The Graduate College website:

- Master of Science (M.S.) Major in Integrated Agricultural Sciences (Thesis Option)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>AG 5320</td>
<td>Integrated Agricultural Production in Aquaponic Systems</td>
</tr>
<tr>
<td>AG 5323</td>
<td>Composting and Integrated Resource Management</td>
</tr>
<tr>
<td>AG 5426</td>
<td>Soil Health and Development</td>
</tr>
<tr>
<td>BIO 5412</td>
<td>Plant Anatomy</td>
</tr>
<tr>
<td>GEO 5415</td>
<td>Geographic Applications of Remote Sensing</td>
</tr>
<tr>
<td>TECH 5382</td>
<td>Sustainability in Industrial Management</td>
</tr>
</tbody>
</table>

Agriculture and Leadership Research Area:
- AG 5320 Integrated Agricultural Production in Aquaponic Systems
- AG 5323 Composting and Integrated Resource Management
- AG 5426 Soil Health and Development
- BIO 5412 Plant Anatomy
- GEO 5415 Geographic Applications of Remote Sensing
- TECH 5382 Sustainability in Industrial Management

Animal Science Research Area:
- AG 5361 Food Technology and Meat Science
- AG 5362 Advanced Animal Science: Minerals and Vitamins in Animal Nutrition
- AG 5364 Biology of Reproduction in Farm Animals
- AG 5463 Animal Molecular Genetics
- BIO 5413 Parasitology

Thesis
- AG 5399A Thesis 3

Choose a minimum of 3 hours from the following:
- AG 5199B Thesis
- AG 5299B Thesis
- AG 5399B Thesis
- AG 5599B Thesis

Total Hours 36

If a student elects to follow the thesis option for the degree, a committee to direct the written thesis will be established. The thesis must demonstrate the student’s capability for research and independent thought. Preparation of the thesis must be in conformity with the Graduate College Guide to Preparing and Submitting a Thesis or Dissertation.

The student must submit an official Thesis Proposal Form (http://www.gradcollege.txstate.edu/forms.html) and proposal to his or her thesis committee. Thesis proposals vary by department and discipline. Please see your department for proposal guidelines and requirements. After signing the form and obtaining committee members' signatures, the graduate advisor's signature if required by the program and the department chair's signature, the student must submit the Thesis Proposal Form with one copy of the proposal attached to the dean of The Graduate College for approval before proceeding with research on the thesis. If the thesis research involves human subjects, the student must obtain exemption or approval from the Texas State Institutional Review Board prior to submitting the proposal form to The Graduate College. The IRB approval letter should be included with the proposal form.
1. The Thesis Submission Approval Form bearing original (wet) and/or electronic signatures of the student and all committee members.
2. One (1) PDF of the thesis in final form, approved by all committee members, uploaded in the online Vireo submission system.

After the dean of The Graduate College approves the thesis, Alkek Library will harvest the document from the Vireo submission system for publishing in the Digital Collections database (according to the student's embargo selection). NOTE: MFA Creative Writing theses will have a permanent embargo and will never be published to Digital Collections.

While original (wet) signatures are preferred, there may be situations as determined by the chair of the committee in which obtaining original signatures is inefficient or has the potential to delay the student's progress. In those situations, the following methods of signing are acceptable:

- signing and faxing the form
- signing, scanning, and emailing the form
- notifying the department in an email from their university's or institution's email account that the committee chair can sign the form on their behalf
- electronically signing the form using the university's licensed signature platform.

If this process results in more than one document with signatures, all documents need to be submitted to The Graduate College together.

No copies are required to be submitted to Alkek Library. However, the library will bind copies submitted that the student wants bound for personal use. Personal copies are not required to be printed on archival quality paper. The student will take the personal copies to Alkek Library and pay the binding fee for personal copies.

Master's level courses in Agriculture: AG

Courses Offered

Agriculture (AG)

AG 5100. Professional Development.
This course introduces key concepts and practices for teaching college courses. It provides regular in-service training and planned periodic evaluations of instructional responsibilities. It is required for first-year teaching and instructional assistants in the Master's of Science in Integrated Agricultural Sciences. Graded on a credit (CR), progress (PR), no-credit (F) basis.

1 Credit Hour. 1 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Graduate Assistantship|Exclude from Graduate GPA
Grade Mode: Leveling/Assistantships

AG 5101. Research Experience.
This course provides students with an opportunity to explore a focused research topic. Ideally the topic would be an emergent topic within their research area that was unplanned and resulted from their initial investigation. May be repeated twice for credit.

1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Grade Mode: Standard Letter

AG 5120. Aquaponic Internship.
This course provides students with hands-on production experience in aquaculture. Students will complete 64 hours of internship with an aquaponic facility.

1 Credit Hour. 0 Lecture Contact Hours. 1 Lab Contact Hour.
Grade Mode: Standard Letter

AG 5199B. Thesis.
This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding. Graded on a credit (CR), progress (PR), no-credit (F) basis.

1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Grade Mode: Credit/No Credit

AG 5299B. Thesis.
This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding. Graded on a credit (CR), progress (PR), no-credit (F) basis.

2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Grade Mode: Credit/No Credit

AG 5300. Applied Statistics and Econometrics for Agriculture.
This course focuses on data analysis, modeling techniques and their applications with statistical inference for agriculture. This course will cover statistical tools applied in agriculture, including probability, sampling, principles of estimation, hypothesis testing, general linear models, multiple regression analysis, qualitative response modeling, and other related tools widely used in agriculture.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

AG 5301. Agricultural Development and Policy.
This course focuses on current issues that integrate agricultural policy, resource development, application of welfare criteria and economic analysis, and food and rural development problems of the U.S. and the world. Course topics include integrated agricultural and rural development, food and nutrition security, commodity issues, and trade policy.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

AG 5302. Economics of Agricultural Production.
This course focuses on analysis of agricultural production economic concepts and models. Topics will include traditional neo-classical theory of the firm, duality theory, resource allocation, production selection, scale of operation of agricultural firms, and risk and uncertainty associated with agricultural production.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

AG 5303. Agricultural Marketing and Price Analysis.
This course emphasizes marketing theory and structure, characteristics of demand and supply of farm products, agricultural price research techniques for evaluating marketing behavior, market legislation, and market development. The course will provide an opportunity for students to develop marketable skills in quantitative price and market analysis.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
AG 5304. Economics of Sustainable Natural Resource Management.
This course provides economic tools to analyze sustainable natural resources and environmental issues. It enables students to develop integrative expertise in economic analysis utilizing natural and behavioral sciences. The integrative expertise provides students with the ability to more effectively, efficiently, and sustainably manage natural resources for multiple objectives.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

This course covers research techniques, literature analysis, the development and implementation of experimental designs, conceptual models and survey instruments.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

AG 5320. Integrated Agricultural Production in Aquaponic Systems.
This course focuses on crop and fish production, pest management, water quality, nutrient management, and economics and marketing in aquaponic systems. Topics covered include contrasts and comparisons to soil based, hydroponic cropping and aquaculture (confined fish production without crop interactions).
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

The course provides experience and theoretical foundation for the basic design, production, management, utilization and marketing of composts, vermicomposts and related products, and non-renewable natural resource issues related to agriculture.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Grade Mode: Standard Letter

AG 5324. Agroecology and Integrated Agriculture.
This course will focus on integrative and ecological principles of agricultural production. Emphasis will be on sustainable agriculture, complex systems, production diversity, integrated animal-crop systems, resilience and small producers.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

AG 5350. Foundations of Ethics and Leadership in Agriculture.
This course prepares students for professional leadership and service in agriculture, with emphasis on applications of ethics and leadership principles. The course will focus on industry ethics and leadership theory in various professional settings in agriculture.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

AG 5351. Grant Development and Management.
This course explores competencies of locating external agency funding for agricultural research, teaching and extension. The principles of producing a competitive proposal that includes multi-, cross and interdisciplinary collaborations are also discussed. The development of the grant proposal, implementation, budget, and evaluation plan will be emphasized.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

This course examines philosophies of program development, implementation and evaluation to meet stakeholders’ expectations. Emphasis is placed on methodologies that effectively evaluate agricultural programs.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

AG 5354. Instructional Design in Agricultural Education.
This course examines instructional design models appropriate from a pedagogical and andragogical viewpoint. Emphasis is placed on theories and models to support the design of print-based, web-based, or multimedia-based instruction. Students will prepare evaluation strategies to assess comprehensive instruction in a high-tech environment.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

AG 5355. Methods of Technological Change.
This course explores the dynamics and culture of technological change in agriculture. Topics covered will include ways to implement change, skills for being an innovator and a change agent, how to predict the effects of change, and the integration of other sciences into agricultural sciences.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

AG 5360. Advancements in Animal Science.
Survey of the current knowledge and concepts in animal production including economic considerations and current production problems in breeding and feeding livestock.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

This course explores the science and instrumentation of meat science; including food safety, processing and evaluation of wholesale and retail cuts of beef, pork, lamb, and poultry; including fresh, cooked/smoked, grilled, and pickled products. The evaluation of consumer preference and economic returns based on product presentation will be included.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

This course is an advanced study of the utilization and requirements of minerals and vitamins in farm and ranch animals. It emphasizes ruminant and non-ruminant mineral and vitamin metabolism and utilization. The utilization of specific minerals and vitamins by different species will be used to explain and predict subsequent performance.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

This course will focus on animal agriculture reproduction and examine the molecular principles of reproduction. Topics will include molecular reproductive endocrinology, advanced physiology and current research in animal reproduction science.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
This course provides students with a broad understanding of the role animals have in society, the influences of animal production on economic development, changes in policy and social viewpoints of animal production, and the development of domesticated animals.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

AG 5370. Special Problems in Technical Agriculture.
Special problems will be selected to meet the needs of the individual student. May be repeated (once) for additional credit when the problem differs.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

AG 5390. Foundation Studies in Agriculture.
This course is a leveling course to provide prerequisite knowledge necessary for graduate-level coursework in Agriculture. Course content varies depending on academic preparation. This course does not earn graduate degree credit. Repeatable up to 9 hours with different emphasis. Prerequisite: Approval of graduate advisor in Agriculture.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Grade Mode: Leveling/Assistantships

AG 5398. Professional Paper.
This course is required for non-thesis students to prepare a professional paper of publishable quality. Specific guidance of graduate faculty is required. Graded on a credit (CR), no-credit (F) basis.
3 Credit Hours. 0 Lecture Contact Hours. 3 Lab Contact Hours.
Grade Mode: Credit/No Credit

AG 5399A. Thesis.
This course represents a student’s initial thesis enrollment. No thesis credit is awarded until the student has completed the thesis in Integrated Agricultural Sciences. Graded on a credit (CR), progress (PR), no-credit (F) basis.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

AG 5399B. Thesis.
This course represents a student’s continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding. Graded on a credit (CR), progress (PR), no-credit (F) basis.
9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Grade Mode: Credit/No Credit

AG 5426. Soil Health and Development.
This course focuses on the fundamental topics of soil health and development. These fundamentals include pedogenesis, mineral composition, tillage practices, soil ecosystem and sustainability, soil biology and soil physics.
4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.
Grade Mode: Standard Letter

This course examines the theory and practice of molecular genetics of livestock. Topics covered include genetic concepts and theory, as well as applications of these concepts in animal agriculture; e.g., Mendelian genetics, genomic revolution, cloning, epigenetics and transgenics. The course emphasizes techniques and underlying biological principles in genetics.
4 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.
Grade Mode: Standard Letter