## Agronomy

### Undergraduate Study

The Department of Agronomy offers a degree of Bachelor of Science (B.S.) degree in agronomy. The curriculum is designed to provide a strong foundation in crop science, soil science, agricultural meteorology, and plant breeding. The curriculum provides both flexibility and direction for students by offering four options: agroecology, crop management and business, plant breeding and biotechnology, and soil and environmental quality. There are many opportunities for undergraduate students to be involved in research and international agriculture.

Graduates have the theoretical and practical knowledge needed for efficient and sustainable production of food, feed, fuel, and fiber. Graduates are skilled in critical thinking, problem solving, and communicating and working effectively with others. They understand the ethical, cultural, and environmental dimensions of issues facing professionals in agriculture and natural resources.

An agronomy major prepares students for employment in agricultural business and industry, agricultural service organizations, crop production and soil management, environmental and natural resource management, and farm management. Graduates pursue careers in the seed, fertilizer, and agricultural chemical industries as field agronomists, crop and soil management specialists, research technicians, sales and marketing specialists, and production managers. State and federal agencies employ agronomists as extension specialists, county extension directors, environmental and natural resource specialists, research associates, soil surveyors, soil conservationists, regulatory agencies as plant, food, and grain inspectors, science-based professional positions, graduate study, or research careers. Additional areas of work open to agronomists include integrated pest management, land appraisal, agricultural finance, turfgrass management, and the home lawn care industry.

The department offers an international scholar program leading to a credentialed title of "Agronomy International Scholar" for agronomy majors who have distinguished themselves in global understanding and international experience. Contact the department for requirements.

Department of Agronomy website - [http://www.agron.iastate.edu/index.aspx](http://www.agron.iastate.edu/index.aspx)

### Curriculum in Agronomy

#### Total Degree Requirement: 128 cr.

Only 65 cr. from a two-year institution may apply which may include up to 16 technical cr.; 9 P-NP cr. of free electives; 2.00 minimum GPA. A minimum of 15 credits of agronomy courses must be earned at Iowa State and not transferred from other institutions.

#### International Perspective: 3 cr.

3 cr. [http://www.registrar.iastate.edu/students/div-ip-guide/IntlPerspectives-current](http://www.registrar.iastate.edu/students/div-ip-guide/IntlPerspectives-current)

#### U.S. Diversity: 3 cr.

3 cr. [http://www.registrar.iastate.edu/students/div-ip-guide/usdiversity-courses](http://www.registrar.iastate.edu/students/div-ip-guide/usdiversity-courses)

#### Communication/Library: 13 cr.

6 cr. of English composition with a C or better and 3 cr. of speech fundamentals with a C or better.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ENGL 150</td>
<td>Critical Thinking and Communication</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 250</td>
<td>Written, Oral, Visual, and Electronic Composition</td>
<td>3</td>
</tr>
<tr>
<td>LIB 160</td>
<td>Information Literacy</td>
<td>1</td>
</tr>
<tr>
<td>SP CM 212</td>
<td>Fundamentals of Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>or AGEDS 311</td>
<td>Presentation and Sales Strategies for Agricultural Audiences</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 302</td>
<td>Business Communication</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 309</td>
<td>Report and Proposal Writing</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 314</td>
<td>Technical Communication</td>
<td>3</td>
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#### Humanities and Social Sciences: 6 cr.

3 cr. from approved humanities list [http://www.agstudent.iastate.edu/agricultureservices/humanities.htm](http://www.agstudent.iastate.edu/agricultureservices/humanities.htm)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ECON 101</td>
<td>Principles of Microeconomics</td>
<td>3</td>
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#### Mathematical Sciences: 6-7 cr.

<table>
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<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>STAT 104</td>
<td>Introduction to Statistics</td>
<td>3</td>
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<tr>
<td>One of the following:</td>
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<tr>
<td>MATH 140</td>
<td>College Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 150</td>
<td>Discrete Mathematics for Business and Social Sciences</td>
<td>3</td>
</tr>
<tr>
<td>MATH 180</td>
<td>Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH 185</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 181</td>
<td>Calculus and Mathematical Modeling for the Life Sciences</td>
<td>4</td>
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#### Physical Sciences: 15-17 cr.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHEM 163</td>
<td>College Chemistry and Laboratory in College Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>&amp; 163L &amp; 177L</td>
<td>General Chemistry I</td>
<td>3-4</td>
</tr>
<tr>
<td>GEOL 100</td>
<td>The Earth</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 111</td>
<td>General Physics</td>
<td>4-5</td>
</tr>
<tr>
<td>or PHYS 115</td>
<td>Physics for the Life Sciences</td>
<td>3</td>
</tr>
<tr>
<td>One of the following:</td>
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<td></td>
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<tr>
<td>AGRON 259</td>
<td>Organic Compounds in Plant and Soils</td>
<td>3</td>
</tr>
<tr>
<td>BBMB 221</td>
<td>Structure and Reactions in Biochemical Processes</td>
<td>3</td>
</tr>
<tr>
<td>or BIOL 313</td>
<td>Principles of Genetics</td>
<td>3</td>
</tr>
<tr>
<td>&amp; 231L &amp; 313</td>
<td>Principles of Genetics and Genetics Laboratory</td>
<td>3</td>
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#### Life and Biological Sciences: 7-8 cr.

<table>
<thead>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 212</td>
<td>Principles of Biology II</td>
<td>4</td>
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<tr>
<td>&amp; 212L &amp; 215</td>
<td>Principles of Biology Laboratory II</td>
<td>3</td>
</tr>
<tr>
<td>AGRON 320</td>
<td>Genetics, Agriculture and Biotechnology</td>
<td>3</td>
</tr>
<tr>
<td>or BIOL 313</td>
<td>Principles of Genetics</td>
<td>3</td>
</tr>
<tr>
<td>&amp; 313L &amp; 315</td>
<td>Principles of Genetics and Genetics Laboratory</td>
<td>3</td>
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#### Agronomy Core: 22.5-23 cr.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>AGRON 105</td>
<td>Leadership Experience</td>
<td>R</td>
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<tr>
<td>AGRON 110</td>
<td>Professional Development in Agronomy; Orientation</td>
<td>0.5-1</td>
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<td>AGRON 114</td>
<td>Principles of Agronomy</td>
<td>3</td>
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<tr>
<td>AGRON 154</td>
<td>Fundamentals of Soil Science</td>
<td>3</td>
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<tr>
<td>AGRON 206</td>
<td>Introduction to Weather and Climate</td>
<td>3</td>
</tr>
<tr>
<td>AGRON 210</td>
<td>Professional Development in Agronomy; Career Planning</td>
<td>1</td>
</tr>
<tr>
<td>AGRON 310</td>
<td>Professional Development in Agronomy: Work Experience</td>
<td>R</td>
</tr>
<tr>
<td>or AGRON 311</td>
<td>Professional Internship in Agronomy</td>
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</tr>
<tr>
<td>AGRON 316</td>
<td>Crop Structure-Function Relationships</td>
<td>3</td>
</tr>
<tr>
<td>AGRON 354</td>
<td>Soils and Plant Growth</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 354L &amp; 355L</td>
<td>Soils and Plant Growth Laboratory</td>
<td></td>
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<tr>
<td>AGRON 410</td>
<td>Professional Development in Agronomy: Senior Forum</td>
<td>1</td>
</tr>
<tr>
<td>Agricultural Issues - 1 course from agriculture issues list - <a href="http://www.agron.iastate.edu/academic/undergraduate/ag_issues.aspx">http://www.agron.iastate.edu/academic/undergraduate/ag_issues.aspx</a></td>
<td>3</td>
<td></td>
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</tbody>
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### Advising Option Choice

Electives:

- 26 credits, student choice

### Advising Options

#### Agroecology

The Agroecology option provides the scientific foundation for understanding and managing agricultural systems with ecological and environmental perspectives. Students may pursue graduate study or careers in sustainable agriculture.

- AGRON 311 Professional Internship in Agronomy | 1
- AGRON 392 Systems Analysis in Crop and Soil Management | 3

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AGRON 450 Issues in Sustainable Agriculture 3
AGRON 497 Agroecology Field Course 3

Biological Science Choices: (Choose at least 2) 6 credits
AGRON 217 Weed Identification 1
AGRON 317 Principles of Weed Science 3
AGRON 334 Forage Crop Management 3
AGRON 485 Soil and Environmental Microbiology 3
ENT 376 Fundamentals of Entomology and Pest Management 3
ENT 471 Insect Ecology 3
HORT 424 Sustainable and Environmental Horticulture Systems 3
HORT 484 Organic Agricultural Theory and Practice 3
PL P 408 Principles of Plant Pathology 3

Physical Science Choices: (Choose 2)
AGRON 360 Environmental Soil Science 3
ENSCI 402 Watershed Hydrology 4
AGRON 404 Global Change 3
AGRON 405 Environmental Biophysics 3
AGRON 406 World Climates 3
AGRON 407 Mesoscale Meteorology 3
AGRON 452 GIS for Geoscientists 3
Social Science Choices: (Choose 1)
AGRON 342 World Food Issues: Past and Present 3
ENSCI 484 Ecosystem Ecology 3
SOC 325 Transition in Agriculture 3

Crop Management and Business
The Crop Management and Business option is designed for those individuals who seek employment as agronomists working in agribusinesses such as cooperatives, seed companies, herbicide and fertilizer dealers, or crop consulting firms.
AGRON 212 Crop Growth, Productivity and Management 3
AGRON 212L Field Application and Problem Solving in Crop Production 1
ENT 376 Fundamentals of Entomology and Pest Management 3
PL P 408 Principles of Plant Pathology 3
AGRON 217 Weed Identification 1
AGRON 317 Principles of Weed Science 3

Problem Solving:
AGRON 392 Systems Analysis in Crop and Soil Management 3
Business Choices: (Choose 3)
ACCT 284 Financial Accounting 3
ECON 102 Principles of Macroeconomics 3
ECON 230 Farm Business Management 3
ECON 235 Introduction to Agricultural Markets 3
Agronomic Choices: (Choose 2)
AGRON 260 Soils and Environmental Quality 3
AGRON 330 Crop and Seed Identification Laboratory 2
AGRON 334 Forage Crop Management 3
AGRON 338 Seed Science and Technology 3
AGRON 360 Environmental Soil Science 3
AGRON 421 Introduction to Plant Breeding 3
AGRON 463 Soil Formation and Landscape Relationships 4
TSM 333 Precision Farming Systems 3

Plant Breeding and Biotechnology
The Plant Breeding and Biotechnology option is for those who would like to work in plant breeding or plant biotechnology.
MATH 165 Calculus I 4
or MATH 181 Calculus and Mathematical Modeling for the Life Sciences I
MATH 166 Calculus II 4
or MATH 182 Calculus and Mathematical Modeling for the Life Sciences II
CHEM 177 General Chemistry I 4
CHEM 177L Laboratory in General Chemistry I 1
CHEM 178 General Chemistry II 3
CHEM 178L Laboratory in College Chemistry II 1

Soil and Environmental Quality
The Soil and Environmental Quality option is designed for those individuals interested in careers in environmental science, soil science, or natural resource management.
AGRON 260 Soils and Environmental Quality 3
Problem Solving Choices: (Choose 1)
AGRON 360 Environmental Soil Science 3
AGRON 392 Systems Analysis in Crop and Soil Management 3
GIS Choices: (Choose 1)
ENSCI 345 Natural Resource Photogrammetry and Geographic Information Systems 3
C R P 451 Introduction to Geographic Information Systems 3
AGRON 452 GIS for Geoscientists 3
Interest Choices: (Choose 3)
AGRON 459 Environmental Soil and Water Chemistry 4
AGRON 463 Soil Formation and Landscape Relationships 4
AGRON 477 Soil Physics 3
AGRON 485 Soil and Environmental Microbiology 3
Interest Choices: (Choose 2)
ENSCI 301 Natural Resource Ecology and Soils 4
ENSCI 402 Watershed Hydrology 4
AGRON 404 Global Change 3
AGRON 405 Environmental Biophysics 3
AGRON 406 World Climates 3
AGRON 407 Mesoscale Meteorology 3

Minor - Agronomy
The department offers a minor in Agronomy that may be earned by taking 18 credits in these agronomy courses: AGRON 114, AGRON 154, AGRON 212 & AGRON 354 and 6 credits from approved agronomy courses, with a minimum of 3 of the 6 credits from courses at the 300 level or higher. At least 9 credits must be taken at Iowa State University with 6 credits numbered 300 or above. At least 9 credits must be unique to the requirements for the minor and not used to fulfill specified requirements from the student’s major.
Courses Required For a Minor:
AGRON 114 Principles of Agronomy 3
AGRON 154 Fundamentals of Soil Science 3
AGRON 212 Crop Growth, Productivity and Management 3
AGRON 354 Soils and Plant Growth 3
Approved Elective Courses for Minor Credit (6 credits minimum, 3 credits at 300+ level)

CROP SCIENCE
AGRON 212L Field Application and Problem Solving in Crop Production 1
AGRON 217 Weed Identification 1
AGRON 330 Crop and Seed Identification Laboratory 2
AGRON 316 Crop Structure-Function Relationships 3
AGRON 317 Principles of Weed Science 3
AGRON 320 Genetics, Agriculture and Biotechnology 3
AGRON 334 Forage Crop Management 3
Graduate Study

The department offers programs degrees that lead to master of science (M.S.) and doctor of philosophy (Ph.D.), with majors in agricultural meteorology; crop production and physiology with optional specialization in seed science or weed science; plant breeding; and soil science with specialization in soil chemistry, soil fertility, soil management, soil microbiology and biochemistry, soil morphology and genesis, or soil physics. Minor work is offered for students with majors in other departments. A dissertation is required for the Ph.D., and a thesis is normally required for the M.S. An M.S. nonthesis option is available for students desiring a general degree program, with additional coursework and a written creative component substituting for thesis research.

Graduates have a broad knowledge base germane to their area of study. They are trained to integrate and apply knowledge to different situations. Students develop skills in scientific reasoning, organization, and logical presentation of ideas.

The department offers an M.S. in agronomy that is designed for students who are currently employed full-time. This program is taught at a distance using computer-based instructional media. The M.S. in agronomy is nonthesis only. The M.S. degree in plant breeding is offered both on-campus or at a distance.

The department cooperates in interdepartmental majors in bioinformatics and computational biology; ecology and evolutionary biology; environmental science; genetics; microbiology; molecular, cellular, and developmental biology; plant biology; and sustainable agriculture.

Prerequisite to major work in this department is completion of an undergraduate degree program with emphasis on agronomic, biological, and physical sciences.