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STOCKSCH 20
**Academic Majors**

**Horticultural Science**
Concepts and practices vital to the preservation of natural resources in managed plant systems are stressed. This major provides students with the tools and knowledge to work in the horticultural field. Students receive scientific training in the production of herbaceous ornamentals, fruits, and vegetables. In addition, students have the option of taking business courses to complement their horticultural training or to further enhance their scientific training through more courses in basic science. The University-operated greenhouses, vegetable field, and orchard are used as laboratory spaces to provide hands-on experience related to knowledge acquired in the classroom. Successful graduates find employment in plant conservatories and arboreta as well as manage businesses, including direct-market farms, greenhouse operations, landscaping firms and nurseries, or they continue to graduate school for advanced degrees.

**Plant and Soil Sciences**
Through theoretical and practical training, the Plant and Soil Sciences major prepares students to tackle real-world problems by integrating and applying knowledge they learn from different disciplines. This major includes rigorous training in biology and laboratory methods. Students focus their study in one of two general areas: plant science or soil science. They may also choose to focus their advanced course work in horticultural science, plant pathology, plant science and biotechnology, soil science or a related discipline. Many successful graduates work in research or applied aspects of the biotech industries, agricultural and horticultural businesses, environmental consulting arenas, and pest management. Others go on for advanced graduate training for careers in academia, business, or the public sector.

**Sustainable Food and Farming**
The Sustainable Food and Farming major allows students who are interested in the practical, social, political and scientific issues of sustainable agriculture and food systems to seek a broad exposure to this discipline in the liberal arts tradition. Students can tailor their individual programs to prepare for careers in sustainable farming, policy, advocacy, community outreach and education in topics related to crop production, food access, and hunger issues, as well as many others. Graduates will be qualified to compete successfully for a wide array of emerging careers in the growing field of sustainable food systems.

**Turfgrass Science and Management**
The Turfgrass Science and Management major is an applied science program that focuses on the production and maintenance of grassed areas, including home lawns, parks, golf courses and other athletic surfaces. This concentration integrates scientific theory with practical experience and covers such topics as grass and seed identification, turfgrass culture and physiology, pest control, and equipment maintenance. Students in this major have the option of selecting a business management or a science focus. Many graduates find employment in the golf course industry, while others choose to specialize in sports turf management. The lawn care industry also employs many of our graduates in jobs as varied as direct lawn maintenance, research, and sales.
GENERAL INFORMATION

Curriculum Requirements
The undergraduate curriculum in the Stockbridge School of Agriculture has been designed with the goal of allowing students to tailor their coursework to best reflect individual academic interests and career objectives. The major encompasses a broad range of related disciplines dealing with applied biology and ecology. Specific majors include: Horticultural Science, Plant and Soil Sciences, Sustainable Food and Farming, and Turfgrass Science and Management.

Students begin their studies with introductory classes in the major and with general education courses required of all University students. These initial courses, which include biology, chemistry, ecology and mathematics, form the foundation for more advanced study in the major. The exact sequence of courses is determined by the student’s selection of an area of study. Independent study and internships are available under each major providing students with the opportunity to integrate laboratory and field work into their curriculum.

All four majors share a common core of discipline areas:

• Biological Science
two semesters of course work with labs in introductory biology, botany and/or soil science
• Chemistry
one semester minimum of introductory chemistry with lab
• Ecosystems Studies
a course in the fundamentals of ecosystem ecology
• Math, Statistics and Reasoning
two semesters in math, statistics and/or analytical reasoning
• Writing
two semesters of writing: College Writing taken during the freshman year, and Junior Year Writing

Independent Study and Internships
Students are encouraged to enhance their major with an independent study research project or an internship experience. These opportunities provide students with experience and training that will be useful in career planning as well as in decision-making regarding fields of possible graduate study. Students must have attained at least sophomore status and be in good academic standing. The University allows up to 18 credits of internship to be applied towards the 120 credits required for graduation.

Independent Study - students wishing to complete a research project or independent learning project must select a faculty member within the major who will approve the project and provide guidance. An Independent Study form must be completed, which specifies the number of credits to be earned, a statement of objectives, planned activities, and criteria to be used for evaluation and grading. This form must be filed with the Director’s Office before the project is initiated.

Internships - an internship is a summer or semester-long work experience that allows students to “apprentice” with professionals in their field. Internships are intended to be learning experiences, and do not necessarily provide significant monetary compensation. Instead, academic credits are earned. Students can earn 12 credits for a full time, semester long internship experience and 3 to 9 credits for a summer program. Prior to undertaking an internship, the student and his/her faculty sponsor must complete an Academic Contract (Independent Study/Practicum form), including planned activities, a statement of objectives, as well as criteria for evaluation and grading.
Major Requirements
Students will complete a minimum of 30 course credits taken within the Stockbridge School of Agriculture. Specific course requirements vary by major.

Research Papers & Projects Assistance
Two librarians are available to Stockbridge School of Agriculture students to provide assistance with finding reliable information for research papers and other projects. Students may contact them for an individual consultation by phone, email, skype, or in person. Please feel free to contact:
- Paulina Borrego, Lederle Grad Research Center; 413-545-7891; pborrego@library.umass.edu
- Madeleine Charney, Du Bois Library; 413-577-0784; mcharney@library.umass.edu

University Requirements

Credits
Minimum 120 credits must be obtained, 45 of which must be earned in residence. Residence credits are defined as credits earned for work done while registered at the UMass Amherst campus or while enrolled in one of the University’s formal exchange programs.

Grade Point Average (GPA)
Minimum Overall Grade Point Average (GPA)
2.00 minimum cumulative GPA is required.

Minimum Stockbridge School of Agriculture Cumulative Grade Point Average (GPA)
2.00 minimum cumulative GPA is required for courses within the Stockbridge School majors.

General Education (GEN ED) Requirements
Consult your Academic Requirements Report (ARR) and/or an advisor for clarification.

NOTE: Freshmen entering in Fall 2010 or later will use the following requirements.
Transfer students entering in Fall 2010 or later must use the Gen Ed Course Planning Guide (on SPIRE).

Analytical Reasoning 1 course
One course (R2) 3 credits

Basic Mathematics 1 course
One course (R1) 3 credits
- OR
Passing score on Tier 1 Math Exemption Exam 0 credits

Biological & Physical World 2 courses
One 4-credit course from each category:
- Biological Science (BS)
  - fall/spr BIOLOGY 151 Introductory Biology I (BS) 4 credits
  - OR
  - fall/spr STOCKSCH 105 Soils 4 credits
Biological & Physical World (cont.)

2. Physical Science (PS)
   fall   CHEM 110   General Chemistry (PS)   4 credits
   OR
   fall/spr CHEM 111   General Chemistry-Science (PS)   4 credits

Integrative Experience    1 course
   One course Integrative Experience (IE)   3 credits

Social & Cultural Diversity    2 courses
   One course from each category:
      can be combined with other Social World designations (eg. ALU, HSG, IG, etc.)
      1. United States diversity (U, ALU, ATU, HSU, IU, or SBU)   3-4 credits
      2. Global diversity (G, ALG, ATG, HSG, IG, or SBG)   3-4 credits

Social World    4 courses
   One 4-credit course from each category:
   1. Arts (AT) or Literature (AL)
   2. Historical Studies (HS)
   3. Social and Behavioral Sciences (SB)
   4. Additional Social World (AL, AT, or SB) or Interdisciplinary (I or SI)

Writing    2 courses
   One course from each category
   1. fall/spr ENGLWRIT 112 (CW)   College Writing   3 credits
      OR
      EXEMPTION/WAIVER (see Writing Program)   0 credits
   2. Junior Year Writing within the major:
      fall/spr NATSCI 387   CNS Junior Writing   3 credits
      OR
      spr STOCKSCH 382   Writing for Sustainability   3 credits

Notes:
   a. From your major department:
      -only one course counts towards Gen Ed requirements
      -one additional course can fulfill a Diversity requirement
   b. No more than three I or SI courses will count towards Gen Ed and Diversity requirements.
   c. Gen Ed courses cannot be taken on a pass/fail basis.
   d. Freshmen entering Fall 2010 and beyond with 9 semester hours or more of college course (not exam) credits taken prior to enrollment can switch to Transfer Gen Ed requirements via the Student Records Office.
HORTICULTURAL SCIENCE  
Dr. Mandy Bayer, Advisor

Core Requirements of the Major

Biological Science

fall/spr  STOCKSCH 105  Soils (BS)  4  
fall  STOCKSCH 108  Introductory Botany  4

Chemistry

fall  CHEM 110  General Chemistry (PS)  4

OR

fall/spr  CHEM 111*  General Chemistry-Science (PS)  4
(*Students selecting Science focus should complete CHEM 111)

Ecosystems Studies

SELECT ONE OF THE FOLLOWING:

fall/spr  BIOLOGY 287  Introductory Ecology  3
fall  ENVIRSCI 101  Introduction to Environmental Science (BS)  4
spr  ENVIRSCI 214  Ecosystems, Biodiversity and Global Change  3
fall  NRC 100  Environment and Society (SI)  4

Integrative Experience

spr  NATSCI 494I  Global Issues in Applied Biology  3

Junior Year Writing

fall/spr  NATSCI 387  CNS Junior Writing  3

Math, Statistics and Reasoning

SELECT COURSE(S) FROM BOTH CATEGORIES 1 & 2:

1. Basic Mathematics (R1)

fall/spr  MATH 101  Precalculus Alg with Functions & Graphs  2
AND
fall/spr  MATH 102  Analytic Geometry & Trigonometry (R1)  2
OR
fall/spr  MATH 104  Algebra, Analytic Geometry, & Trig (R1)  3

2. Analytical Reasoning (R2)

fall/spr  STATISTIC 111  Elementary Statistics (R2)  4
OR
fall/spr  STATISTIC 240  Introduction to Statistics (R2)  3

Total Core Requirements  27-30
HORTICULTURAL SCIENCE

Major Requirements

Horticulture
SELECT TWO OF THE FOLLOWING:

- fall/odd yrs STOCKSCH 200 Plant Propagation 3
- fall/even yrs STOCKSCH 315 Greenhouse Management 4
- spr STOCKSCH 335 Prin & Practices of Greenhouse Cultivation 4
- fall/odd yrs STOCKSCH 360 Landscape Plant Production 4

Pest Management

- fall STOCKSCH 505 General Plant Pathology 4

3 CREDITS MINIMUM IN ENTOMOLOGY:

- spr STOCKSCH 101 Insects & Related Forms 2
- fall STOCKSCH 109 Insects of Ornamentals 3
- fall STOCKSCH 326 Insect Biology 3

Plant Nutrition

SELECT ONE OF THE FOLLOWING:

- fall STOCKSCH 530 Plant Nutrition 4

- spr STOCKSCH 580 Soil Fertility 3

Plant Physiology

SELECT ONE OF THE FOLLOWING:

- spr BIOLOGY 510 Plant Physiology 4
- spr STOCKSCH 384 Introduction to Plant Physiology 3

Restricted Electives

SELECT 15 CREDITS MINIMUM FROM COURSES LISTED BELOW
AT LEAST 6 CREDITS MUST BE AT OR ABOVE 500-LEVEL
6 CREDITS MAXIMUM MAY BE TAKEN OUTSIDE THE DEPARTMENT
COURSES CAN BE MIXED AND MATCHED ACROSS MORE THAN ONE SUBJECT AREA

CREDITS TAKEN TO SATISFY MAJOR REQUIREMENTS IN OTHER AREAS OF THE CORE REQUIREMENTS FOR THE MAJOR AND FOR OTHER MAJOR REQUIREMENTS CANNOT BE COUNTED AS RESTRICTED ELECTIVES

Crop Physiology

- spr BIOLOGY 510 Plant Physiology 4
- fall STOCKSCH 523 Plant Stress Physiology 3
- spr STOCKSCH 545 Postharvest Biology 4
- spr STOCKSCH 550 Plant Hormones & Applied Plant Physiology 3
<table>
<thead>
<tr>
<th>Course Category</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food Crops</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fall/spr</td>
<td>STOCKSCH 120</td>
<td>Organic Farming and Gardening (BS)</td>
<td>4</td>
</tr>
<tr>
<td>fall/odd yrs</td>
<td>STOCKSCH 300</td>
<td>Deciduous Orchards Science</td>
<td>3</td>
</tr>
<tr>
<td>fall/even yrs</td>
<td>STOCKSCH 305</td>
<td>Small Fruit Production</td>
<td>3</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 310</td>
<td>Principles of Weed Management</td>
<td>3</td>
</tr>
<tr>
<td>spr/odd yrs</td>
<td>STOCKSCH 320</td>
<td>Organic Vegetable Production</td>
<td>3</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 350</td>
<td>Sustainable Soil &amp; Crop Management</td>
<td>3</td>
</tr>
<tr>
<td><strong>Greenhouse Horticulture</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 255</td>
<td>Herbaceous Plants</td>
<td>3</td>
</tr>
<tr>
<td>fall/even yrs</td>
<td>STOCKSCH 315</td>
<td>Greenhouse Management</td>
<td>4</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 335</td>
<td>Prin and Practices of Greenhouse Cultivation</td>
<td>4</td>
</tr>
<tr>
<td>fall/odd yrs</td>
<td>STOCKSCH 360</td>
<td>Landscape Plant Production</td>
<td>4</td>
</tr>
<tr>
<td>fall/even yrs</td>
<td>STOCKSCH 397PT</td>
<td>Plant Trends in Landscape Horticulture</td>
<td>3</td>
</tr>
<tr>
<td>fall</td>
<td>SUSTCOMM 335</td>
<td>Plants in Landscape</td>
<td>4</td>
</tr>
<tr>
<td><strong>Landscape Horticulture</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fall</td>
<td>NRC 232</td>
<td>Principles of Arboriculture</td>
<td>3</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 255</td>
<td>Herbaceous Plants</td>
<td>3</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 310</td>
<td>Principles of Weed Management</td>
<td>3</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 335</td>
<td>Prin and Practices of Greenhouse Cultivation</td>
<td>4</td>
</tr>
<tr>
<td>fall/odd yrs</td>
<td>STOCKSCH 360</td>
<td>Landscape Plant Production</td>
<td>4</td>
</tr>
<tr>
<td>fall/even yrs</td>
<td>STOCKSCH 397PT</td>
<td>Plant Trends in Landscape Horticulture</td>
<td>3</td>
</tr>
<tr>
<td>fall</td>
<td>SUSTCOMM 335</td>
<td>Plants in Landscape</td>
<td>4</td>
</tr>
<tr>
<td><strong>Pest Management</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 109</td>
<td>Insects of Ornamentals</td>
<td>3</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 510</td>
<td>Management &amp; Ecology of Plant Diseases</td>
<td>3</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 587</td>
<td>Phyto/Bioremediation</td>
<td>3</td>
</tr>
<tr>
<td><strong>Plant Nutrition and Soils</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 515</td>
<td>Microbiology of the Soil</td>
<td>3</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 530</td>
<td>Plant Nutrition</td>
<td>4</td>
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<tr>
<td>fall</td>
<td>STOCKSCH 575</td>
<td>Environmental Soil Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 580</td>
<td>Soil Fertility</td>
<td>3</td>
</tr>
</tbody>
</table>

**Focus**

SELECT BUSINESS OR SCIENCE FOCUS:

1. **Business Focus**

   SELECT FOUR COURSES IN BUSINESS
   THESE COURSES SHOULD BE DISTRIBUTED ACROSS FOUR OF THE FIVE CATEGORIES BELOW (a-e):

   a. fall/spr ACCOUNTG 221 Principles of Financial Accounting 3
   OR
   OR
   OR
   OR
   spr RES-ECON 324 Small Business Finance 3
HORTICULTURAL SCIENCE

1. Business Focus (cont.)
   b. fall/spr ECON 103 Introduction to Microeconomics (SB) 4
      OR
   fall/spr ECON 104 Introduction to Macroeconomics (SB) 4
      OR
   fall/spr RES-ECON 102 Introductory Resource Economics (SB) 4
   c. fall/spr HT-MGT 260 Human Resource Mgt/Hospitality Industry 3
      OR
   fall/spr MANAGMNT 314 Human Resource Management 3
   d. fall/spr MANAGMNT 301 Principles of Management 3
   e. fall/spr MARKETNG 301 Fundamentals of Marketing 3

2. Science Focus
   SELECT FOUR COURSES IN SCIENCE
   CHOOSE ONE COURSE FROM EACH OF THE FOUR CATEGORIES (a-d) BELOW:
   a. fall/spr BIOLOGY 151 Introductory Biology I (BS) 4
   b. fall/spr BIOLOGY 285 Cellular & Molecular Biology 3
      OR
   spr CHEM 250 Organic Chemistry 3
      OR
   fall/spr CHEM 261 Organic Chemistry 3
   c. fall/spr CHEM 112 General Chemistry-Science (PS) 4
   d. fall/spr MATH 127 Calculus for the Life and Social Sciences I (R2) 3
      OR
   fall/spr MATH 131 Calculus I (R2) 4

Total Major Requirements  47-53

SUMMARY OF REQUIREMENTS

Total Core Requirements  27-30
   Biological Science  8
   Chemistry  4
   Ecosystems Studies  3-4
   Integrative Experience  3
   Junior Year Writing  3
   Math, Statistics and Reasoning  6-8

Total Major Requirements  47-53
   Required Courses  20-23
   Restricted Electives  27-30

Grand Total for Horticultural Science  74-83
# Plant and Soil Sciences

Dr. Susan Han, Advisor

## Core Requirements of the Major

<table>
<thead>
<tr>
<th>Period</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>fall/spr</td>
<td>STOCKSCH 105</td>
<td>Soils (BS)</td>
<td>4</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 108</td>
<td>Introductory Botany</td>
<td>4</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 384</td>
<td>Introduction to Plant Physiology</td>
<td>3</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 505</td>
<td>General Plant Pathology</td>
<td>4</td>
</tr>
</tbody>
</table>

**Total Core Requirements 15**

## Major Requirements

### Basic Mathematics (R1)

<table>
<thead>
<tr>
<th>Period</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>fall/spr</td>
<td>MATH 101</td>
<td>Precalculus Alg with Functions &amp; Graphs</td>
<td>2</td>
</tr>
<tr>
<td>AND</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fall/spr</td>
<td>MATH 102</td>
<td>Analytic Geometry &amp; Trigonometry (R1)</td>
<td>2</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fall/spr</td>
<td>MATH 104</td>
<td>Algebra, Analytic Geometry, &amp; Trig (R1)</td>
<td>3</td>
</tr>
</tbody>
</table>

### Biological Science

<table>
<thead>
<tr>
<th>Period</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>fall/spr</td>
<td>BIOLOGY 151</td>
<td>Introductory Biology I (BS)</td>
<td>4</td>
</tr>
<tr>
<td>fall/spr</td>
<td>BIOLOGY 152</td>
<td>Introductory Biology II</td>
<td>3</td>
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<tr>
<td>fall/spr</td>
<td>BIOLOGY 283</td>
<td>General Genetics</td>
<td>3</td>
</tr>
<tr>
<td>fall/spr</td>
<td>BIOLOGY 285</td>
<td>Cellular &amp; Molecular Biology</td>
<td>3</td>
</tr>
</tbody>
</table>

### Chemistry

<table>
<thead>
<tr>
<th>Period</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>fall/spr</td>
<td>CHEM 111</td>
<td>General Chemistry-Science (PS)</td>
<td>4</td>
</tr>
<tr>
<td>fall/spr</td>
<td>CHEM 112</td>
<td>General Chemistry-Science (PS)</td>
<td>4</td>
</tr>
</tbody>
</table>

### Ecosystems Studies

Select one of the following suggested courses:

<table>
<thead>
<tr>
<th>Period</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>fall/spr</td>
<td>BIOLOGY 287</td>
<td>Introductory Ecology</td>
<td>3</td>
</tr>
<tr>
<td>fall</td>
<td>ENVRSCS 101</td>
<td>Introduction to Environmental Science (BS)</td>
<td>4</td>
</tr>
<tr>
<td>spr</td>
<td>ENVRSCS 214</td>
<td>Ecosystems, Biodiversity &amp; Global Change</td>
<td>3</td>
</tr>
<tr>
<td>fall</td>
<td>NRC 100</td>
<td>Environment and Society (SI)</td>
<td>4</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 390N</td>
<td>Ecosystem Processes</td>
<td>3</td>
</tr>
</tbody>
</table>

### General Science

Select 6 credits minimum from the following suggested courses:

<table>
<thead>
<tr>
<th>Period</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>fall/spr</td>
<td>BIOCHEM 420</td>
<td>Elementary Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>fall/spr</td>
<td>CHEM 261</td>
<td>Organic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>fall/spr</td>
<td>CHEM 262</td>
<td>Organic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>fall/spr</td>
<td>MICROBIO 310</td>
<td>General Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>fall/spr</td>
<td>MICROBIO 312</td>
<td>Microbiology Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>fall/spr</td>
<td>PHYSICS 131/151</td>
<td>Introductory Physics I/General Physics I (PS)</td>
<td>4</td>
</tr>
<tr>
<td>fall/spr</td>
<td>PHYSICS 132/152</td>
<td>Introductory Physics II/General Physics II (PS)</td>
<td>4</td>
</tr>
<tr>
<td>fall/spr</td>
<td>STATISTIC 111/240</td>
<td>Elem Statistics/Intro to Statistics (R2)</td>
<td>4/3</td>
</tr>
</tbody>
</table>
## PLANT AND SOIL SCIENCES

**Integrative Experience**

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>spr</td>
<td>NATSCI 494I</td>
<td>Global Issues in Applied Biology</td>
</tr>
</tbody>
</table>

**Junior Year Writing**

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>fall/spr</td>
<td>NATSCI 387</td>
<td>CNS Junior Writing</td>
</tr>
</tbody>
</table>

**Experimental Techniques Course or Independent Study**

SELECT 2-4 CREDITS FROM THE FOLLOWING SUGGESTED COURSES:

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>fall/spr</td>
<td>BIOLOGY 153</td>
<td>Introductory Biology Lab</td>
</tr>
<tr>
<td>spr</td>
<td>BIOLOGY 383H</td>
<td>Gene and Genome Analysis</td>
</tr>
<tr>
<td>fall/spr</td>
<td>CHEM 269</td>
<td>Organic Chemistry Lab</td>
</tr>
<tr>
<td>spr</td>
<td>MICROBIO 385</td>
<td>Introduction to Biotechnology Laboratory</td>
</tr>
<tr>
<td>fall/spr</td>
<td>NRC 585</td>
<td>Introduction to GIS</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 390A</td>
<td>Plant Biotechnology &amp; Tissue Culture</td>
</tr>
</tbody>
</table>

**Restricted Electives**

SELECT 12 CREDITS MINIMUM AT OR ABOVE 300-LEVEL WITH 6 CREDITS MINIMUM AT 500-LEVEL COURSES MAY BE MIXED AND MATCHED ACROSS MORE THAN ONE SUBJECT AREA

### Horticultural Science

<table>
<thead>
<tr>
<th>Term/Year</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>fall/odd yrs</td>
<td>STOCKSCH 300</td>
<td>Deciduous Orchards Science</td>
</tr>
<tr>
<td>fall/even yrs</td>
<td>STOCKSCH 305</td>
<td>Small Fruit Production</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 310</td>
<td>Principles of Weed Management</td>
</tr>
<tr>
<td>fall/even yrs</td>
<td>STOCKSCH 315</td>
<td>Greenhouse Management</td>
</tr>
<tr>
<td>spr/odd yrs</td>
<td>STOCKSCH 320</td>
<td>Organic Vegetable Production</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 335</td>
<td>Prin &amp; Practices of Greenhouse Cultivation</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 350</td>
<td>Sustainable Soil &amp; Crop Management</td>
</tr>
<tr>
<td>fall/odd yrs</td>
<td>STOCKSCH 360</td>
<td>Landscape Plant Production</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 397GB</td>
<td>Grapevine Biology</td>
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<tr>
<td>fall/even yrs</td>
<td>STOCKSCH 397PT</td>
<td>Plant Trends in Landscape Horticulture</td>
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<tr>
<td>fall</td>
<td>STOCKSCH 505</td>
<td>General Plant Pathology</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 510</td>
<td>Management &amp; Ecology of Plant Diseases</td>
</tr>
<tr>
<td>fall/odd yrs</td>
<td>STOCKSCH 525</td>
<td>Mycology</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 530</td>
<td>Plant Nutrition</td>
</tr>
<tr>
<td>fall/odd yrs</td>
<td>STOCKSCH 535</td>
<td>Diagnostic Plant Pathology</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 545</td>
<td>Postharvest Biology</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 550</td>
<td>Plant Hormones &amp; Applied Plant Physiology</td>
</tr>
<tr>
<td>fall/even yrs</td>
<td>STOCKSCH 572</td>
<td>Nematology</td>
</tr>
<tr>
<td>fall</td>
<td>STOCKSCH 575</td>
<td>Environmental Soil Chemistry</td>
</tr>
<tr>
<td>spr</td>
<td>STOCKSCH 580</td>
<td>Soil Fertility</td>
</tr>
</tbody>
</table>

### Plant Biotechnology

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>fall/spr</td>
<td>BIOLOGY 284</td>
<td>General Genetics Lab</td>
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<tr>
<td>spr</td>
<td>BIOLOGY 383H</td>
<td>Gene and Genome Analysis</td>
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</table>
## PLANT AND SOIL SCIENCES

### Plant Biotechnology (cont.)

<table>
<thead>
<tr>
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<th>Course Title</th>
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<tbody>
<tr>
<td>spr BIOLOGY 379H</td>
<td>Genomics and Bioinformatics</td>
<td>3</td>
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<tr>
<td>spr BIOLOGY 510</td>
<td>Plant Physiology</td>
<td>4</td>
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<tr>
<td>fall STOCKSCH 530</td>
<td>Plant Nutrition</td>
<td>4</td>
</tr>
<tr>
<td>fall STOCKSCH 587</td>
<td>Phyto/Bioremediation</td>
<td>3</td>
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</tbody>
</table>

### Plant Pathology

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>fall/spr MICROBIO 310</td>
<td>General Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>fall/spr MICROBIO 312</td>
<td>Microbiology Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>fall STOCKSCH 505</td>
<td>General Plant Pathology</td>
<td>4</td>
</tr>
<tr>
<td>spr STOCKSCH 510</td>
<td>Management &amp; Ecology of Plant Diseases</td>
<td>3</td>
</tr>
<tr>
<td>fall STOCKSCH 523</td>
<td>Plant Stress Physiology</td>
<td>3</td>
</tr>
<tr>
<td>spr/odd yrs STOCKSCH 535</td>
<td>Diagnostic Plant Pathology</td>
<td>4</td>
</tr>
<tr>
<td>spr STOCKSCH 545</td>
<td>Postharvest Biology</td>
<td>4</td>
</tr>
<tr>
<td>fall/even yrs STOCKSCH 572</td>
<td>Nematology</td>
<td>4</td>
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### Soil Science

<table>
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<tr>
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<tbody>
<tr>
<td>spr GEO-SCI 519</td>
<td>Aqueous Envrn Geochemistry</td>
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<tr>
<td>fall/even yrs GEO-SCI 563</td>
<td>Glacial Geology</td>
<td>4</td>
</tr>
<tr>
<td>spr GEO-SCI 587</td>
<td>Hydrogeology</td>
<td>4</td>
</tr>
<tr>
<td>spr NRC 568</td>
<td>Wetland Soils</td>
<td>2</td>
</tr>
<tr>
<td>fall STOCKSCH 350</td>
<td>Sustainable Soil &amp; Crop Management</td>
<td>3</td>
</tr>
<tr>
<td>fall STOCKSCH 515</td>
<td>Microbiology of the Soil</td>
<td>3</td>
</tr>
<tr>
<td>fall STOCKSCH 575</td>
<td>Environmental Soil Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>spr STOCKSCH 580</td>
<td>Soil Fertility</td>
<td>3</td>
</tr>
<tr>
<td>spr STOCKSCH 585</td>
<td>Inorganic Contaminants/Soil,Water,&amp; Sediment</td>
<td>3</td>
</tr>
<tr>
<td>fall STOCKSCH 587</td>
<td>Phyto/Bioremediation</td>
<td>3</td>
</tr>
<tr>
<td>spr STOCKSCH 590M</td>
<td>Microbe-Mineral-Organic Matter/Soils</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Major Requirements**  53-57

### SUMMARY OF REQUIREMENTS

**Total Core Requirements**  15

**Total Major Requirements**  53-57

- Basic Mathematics  3-4
- Biological Science  13
- Chemistry  8
- Ecosystems Studies  3-4
- General Science  6
- Integrative Experience  3
- Junior Year Writing  3
- Experimental Techniques Course or Independent Study  2-4
- Restricted Electives  12

**Grand Total for Plant and Soil Sciences**  68-72
Sustainable Food and Farming

Core Requirements of the Major

Biological Science

- fall/spr  STOCKSCH 105  Soils (BS)  4
- fall  STOCKSCH 108  Introductory Botany  4

Chemistry

- fall  CHEM 110  General Chemistry (PS)  4
- OR  OR  OR
- fall/spr  CHEM 111  General Chemistry-Science (PS)  4
- OR  OR  OR
- fall  CHEM 121H  Honors General Chemistry-Science (PS)  4

Ecosystems Studies

SELECT ONE OF THE FOLLOWING

- OTHER ECOSYSTEMS COURSES MAY BE SUBSTITUTED WITH ADVISOR APPROVAL
- fall/spr  BIOLOGY 287  Introductory Ecology  3
- fall  STOCKSCH 186  Introduction to Permaculture  3

Food/Land Policy or Agricultural Education

SELECT ONE OF THE FOLLOWING:

- fall  STOCKSCH 297AL  Agricultural Leadership & Community Educ  3
- fall/even yrs  STOCKSCH 356  Food Justice and Policy  3

Integrative Experience

- spr  NATSCI 494I  Global Issues in Applied Biology  3
- OR  OR  OR
- fall  STOCKSCH 379  Agricultural Systems Thinking  3

Junior Year Writing

- fall/spr  NATSCI 387  CNS Junior Writing  3
- OR  OR  OR
- spr  STOCKSCH 382  Professional Dev in Sustainable Food&Farming  3

Math, Statistics and Reasoning

SELECT COURSE(S) FROM BOTH CATEGORIES 1 & 2:

1. Basic Mathematics (R1)

- fall/spr  MATH 101  Precalculus Alg with Functions & Graphs  2
- AND  AND
- fall/spr  MATH 102  Analytic Geometry & Trigonometry (R1)  2
- OR  OR
- fall/spr  MATH 104  Algebra, Analytic Geometry, & Trig (R1)  3
- OR  OR
- fall/spr  MATH 127  Calculus for the Life and Social Sciences I (R2)  3

2. Analytical Reasoning (R2)

- Advisor Approval Required  3

Total Core Requirements  27-31
# Sustainable Food and Farming

## Major Requirements

### Agricultural Science and Practice

Select 18 credits minimum with 12 credits at or above 200-level.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spr</td>
<td>ANIMLSCI 103</td>
<td>Introductory Animal Management</td>
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<tr>
<td>Fall</td>
<td>ANIMLSCI 220</td>
<td>Physiology &amp; Anatomy of Domestic Animals</td>
<td>4</td>
</tr>
<tr>
<td>Spr</td>
<td>STOCKSCH 101</td>
<td>Insects &amp; Related Forms</td>
<td>2</td>
</tr>
<tr>
<td>Spr</td>
<td>STOCKSCH 111</td>
<td>Introductory Plant Pathology</td>
<td>2</td>
</tr>
<tr>
<td>Fall/Spr</td>
<td>STOCKSCH 120</td>
<td>Organic Farming and Gardening (BS)</td>
<td>4</td>
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<tr>
<td>Spr</td>
<td>STOCKSCH 182</td>
<td>Principles of Pesticide Management</td>
<td>2</td>
</tr>
<tr>
<td>Fall</td>
<td>STOCKSCH 186</td>
<td>Introduction to Permaculture</td>
<td>3</td>
</tr>
<tr>
<td>Spr</td>
<td>STOCKSCH 190P</td>
<td>Personal Wellness for Farmers &amp; Gardeners</td>
<td>3</td>
</tr>
<tr>
<td>Fall/Odd Yrs</td>
<td>STOCKSCH 200</td>
<td>Plant Propagation</td>
<td>3</td>
</tr>
<tr>
<td>Spr</td>
<td>STOCKSCH 235</td>
<td>Pruning Fruit Crops</td>
<td>2</td>
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<tr>
<td>Spr</td>
<td>STOCKSCH 255</td>
<td>Herbaceous Plants</td>
<td>3</td>
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<tr>
<td>Spr</td>
<td>STOCKSCH 258</td>
<td>Urban Agriculture</td>
<td>3</td>
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<tr>
<td>Fall</td>
<td>STOCKSCH 265</td>
<td>Sustainable Agriculture</td>
<td>3</td>
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<tr>
<td>Fall</td>
<td>STOCKSCH 269</td>
<td>Small Farm Husbandry: Pigs &amp; Poultry</td>
<td>3</td>
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<tr>
<td>Spr</td>
<td>STOCKSCH 286</td>
<td>Permaculture Design and Practice</td>
<td>3</td>
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<tr>
<td>Spr</td>
<td>STOCKSCH 290W</td>
<td>Organic Weed Control</td>
<td>3</td>
</tr>
<tr>
<td>Fall</td>
<td>STOCKSCH 297AL</td>
<td>Agricultural Leadership &amp; Community Educ</td>
<td>3</td>
</tr>
<tr>
<td>Fall/Odd Yrs</td>
<td>STOCKSCH 300</td>
<td>Deciduous Orchards Science</td>
<td>3</td>
</tr>
<tr>
<td>Fall/Even Yrs</td>
<td>STOCKSCH 305</td>
<td>Small Fruit Production</td>
<td>3</td>
</tr>
<tr>
<td>Fall</td>
<td>STOCKSCH 310</td>
<td>Principles of Weed Management</td>
<td>3</td>
</tr>
<tr>
<td>Fall/Even Yrs</td>
<td>STOCKSCH 315</td>
<td>Greenhouse Management</td>
<td>4</td>
</tr>
<tr>
<td>Spr/Odd Yrs</td>
<td>STOCKSCH 320</td>
<td>Organic Vegetable Production</td>
<td>3</td>
</tr>
<tr>
<td>Fall</td>
<td>STOCKSCH 326</td>
<td>Insect Biology</td>
<td>3</td>
</tr>
<tr>
<td>Fall/Odd Yrs</td>
<td>STOCKSCH 355</td>
<td>Community Food Systems</td>
<td>3</td>
</tr>
<tr>
<td>Fall/Even Yrs</td>
<td>STOCKSCH 356</td>
<td>Food Justice and Policy</td>
<td>3</td>
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<tr>
<td>Spr</td>
<td>STOCKSCH 370</td>
<td>Tropical Agriculture</td>
<td>3</td>
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<tr>
<td>Spr</td>
<td>STOCKSCH 390G</td>
<td>Sustainable Grape Production</td>
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<tr>
<td>Spr</td>
<td>STOCKSCH 398E</td>
<td>Farm Enterprise Practicum</td>
<td>3-6</td>
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<tr>
<td>Fall/Spr</td>
<td>STOCKSCH 398G</td>
<td>Greenhouse Practicum</td>
<td>1-18</td>
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<tr>
<td>Fall</td>
<td>STOCKSCH 498E</td>
<td>Farm Enterprise Practicum II</td>
<td>1-6</td>
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<td>General Plant Pathology</td>
<td>4</td>
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<td>Spr</td>
<td>STOCKSCH 510</td>
<td>Management &amp; Ecology of Plant Diseases</td>
<td>3</td>
</tr>
<tr>
<td>Fall</td>
<td>STOCKSCH 530</td>
<td>Plant Nutrition</td>
<td>4</td>
</tr>
<tr>
<td>Spr</td>
<td>STOCKSCH 580</td>
<td>Soil Fertility</td>
<td>3</td>
</tr>
</tbody>
</table>

### Professional Electives

Courses may also be used to meet Gen Ed requirements.

Select 18 credits minimum across the three categories with one course minimum from each category. Courses may be taken from other departments or from one of the other five colleges with advisor approval.
SUSTAINABLE FOOD AND FARMING

Professional Electives (cont.)

EXAMPLES OF PRE-APPROVED COURSES ARE LISTED BELOW
OTHER COURSES MAY FULFILL THIS REQUIREMENT WITH ADVISOR APPROVAL

1. Biophysical Systems

   EXAMPLES
   
   fall    BIOLOGY 421     Plant Ecology  4
   Most STOCKSCH courses  3-4

2. Economic Systems

   EXAMPLES
   
   fall/spr  ECON 308     Political Economy of the Environment  3
   fall/spr  ECON 366     Economic Development  3
   fall/spr  HT-MGT 260    Human Resource Mgt/Hospitality Industry  3
                       OR
                       OR
   fall/spr  MANAGMNT 314 Human Resource Management  3
   fall/spr  MANAGMNT 301 Principles of Management  3
   fall/spr  MARKETNG 301 Fundamentals of Marketing  3
   fall/spr  RES-ECON 212 Introductory Statistics/Social Sciences (R2)  4
   spr      RES-ECON 262   Environmental Economics (SB)  4
   fall      RES-ECON 263 Natural Resource Economics (SB)  4
   spr      RES-ECON 324   Small Business Finance  3

3. Social Systems

   EXAMPLES
   
   spr      EDUC 377     Introduction to Multicultural Education  4
   spr      NRC 409      Natural Resource Policy & Administration  3

12 CREDITS MAXIMUM OF RESTRICTED ELECTIVES CAN BE SATISFIED BY INTERNSHIP/PRACTICUM
APPROVAL REQUIRED OF ACADEMIC ADVISOR AND DEAN OF UNDERGRADUATE AFFAIRS

   fall/spr  STOCKSCH 396 Independent Study  1-6
   fall/spr  STOCKSCH 398 Practicum  1-12
   fall/spr  STOCKSCH 496 Independent Study  1-6
   fall/spr  STOCKSCH 498 Practicum  1-12

Advanced Courses

SELECT TWO ADDITIONAL STOCKSCH COURSES AT OR ABOVE 500-LEVEL
6 CREDITS MINIMUM
COURSES NOT FROM STOCKSCH MUST BE APPROVED BY ADVISOR

Total Major Requirements  42

Minimum Required Credits

30 STOCKSCH CREDITS MINIMUM


**SUSTAINABLE FOOD AND FARMING**

**SUMMARY OF REQUIREMENTS**

**Total Core Requirements**
- Biological Science: 8
- Chemistry: 4
- Ecosystems Studies: 3
- Food/Land Policy or Agricultural Education: 3
- Integrative Experience: 3
- Junior Year Writing: 3
- Math, Statistics and Reasoning: 3-7


**Total Major Requirements**
- Agricultural Science and Practice: 18
- Professional Electives: 18
- Advanced Courses: 6

Grand Total for Plant and Soil Sciences: 69-73
## Core Requirements of the Major

### Biological Science
- **fall/spr** STOCKSCH 105 Soils (BS)  
  4
- **fall** STOCKSCH 108 Introductory Botany  
  4

### Chemistry
- **fall** CHEM 110 General Chemistry (PS)  
  4
- **OR** CHEM 111* General Chemistry-Science (PS)  
  4

(*Students selecting Science focus should complete CHEM 111)

### Ecosystems Studies
- **SELECT ONE OF THE FOLLOWING:**
  - **fall/spr** BIOLOGY 287 Introductory Ecology  
    3
  - **fall** ENVIRSCI 101 Introduction to Environmental Science (BS)  
    4
  - **spr** ENVIRSCI 214 Ecosystems, Biodiversity and Global Change  
    3
  - **fall** NRC 100 Environment and Society (SI)  
    4

### Integrative Experience
- **spr** NATSCI 494I Global Issues in Applied Biology  
  3

### Junior Year Writing
- **fall/spr** NATSCI 387 CNS Junior Writing  
  3

### Math, Statistics and Reasoning
- **SELECT COURSE(S) FROM BOTH CATEGORIES 1 & 2:**
  1. **Basic Mathematics (R1)**
     - **fall/spr** MATH 101 Precalculus Alg with Functions & Graphs  
       2
     - **AND**
     - **AND**
     - **fall/spr** MATH 102 Analytic Geometry & Trigonometry (R1)  
       2
     - **OR**
     - **OR**
     - **fall/spr** MATH 104 Algebra, Analytic Geometry, & Trig (R1)  
       3
  2. **Analytical Reasoning (R2)**
     - **fall/spr** RES-ECON 212 Introductory Statistics/Social Sciences (R2)  
       4
     - **OR**
     - **fall/spr** STATISTC 111 Elementary Statistics (R2)  
       4
     - **OR**
     - **fall/spr** STATISTC 240 Introduction to Statistics (R2)  
       3

**Total Core Requirements 27-30**
TURFGRASS SCIENCE AND MANAGEMENT

MAJOR REQUIREMENTS

Required Courses

Pest Management

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Spr</td>
<td>STOCKSCH 101</td>
<td>Insects &amp; Related Forms</td>
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<td>OR</td>
<td></td>
<td></td>
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<tr>
<td>Fall</td>
<td>STOCKSCH 326</td>
<td>Insect Biology</td>
<td>3</td>
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<tr>
<td>Spr</td>
<td>STOCKSCH 107</td>
<td>Turfgrass Insects</td>
<td>2</td>
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<tr>
<td>Fall</td>
<td>STOCKSCH 505</td>
<td>General Plant Pathology</td>
<td>4</td>
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Plant Nutrition

SELECT ONE OF THE FOLLOWING:

<table>
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<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>Fall</td>
<td>STOCKSCH 530</td>
<td>Plant Nutrition</td>
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<tr>
<td>Spr</td>
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<td>Soil Fertility</td>
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Plant Physiology

<table>
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<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spr</td>
<td>STOCKSCH 384</td>
<td>Introduction to Plant Physiology</td>
<td>3</td>
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</table>

Turf

<table>
<thead>
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<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>Fall</td>
<td>STOCKSCH 230</td>
<td>Introductory Turfgrass Management</td>
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<tr>
<td>Spr</td>
<td>STOCKSCH 275</td>
<td>Turfgrass Physiology &amp; Ecology</td>
<td>3</td>
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<td>Fall</td>
<td>STOCKSCH 310</td>
<td>Principles of Weed Management</td>
<td>3</td>
</tr>
<tr>
<td>Spr</td>
<td>STOCKSCH 340</td>
<td>Advanced Turfgrass Management</td>
<td>3</td>
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</table>

Restricted Electives

CREDITS TAKEN TO SATISFY MAJOR REQUIREMENTS IN OTHER AREAS CANNOT BE COUNTED AS RESTRICTED ELECTIVES

SELECT 12 CREDITS MINIMUM FROM COURSES LISTED BELOW
AT LEAST 6 CREDITS AT OR ABOVE 500-LEVEL
MAXIMUM 6 CREDITS MAY BE TAKEN OUTSIDE THE MAJOR

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall/spr</td>
<td>BIOLOGY 283</td>
<td>General Genetics</td>
<td>3</td>
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<tr>
<td>Fall</td>
<td>NRC 232</td>
<td>Principles of Arboriculture</td>
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<td>Fall/odd yrs</td>
<td>STOCKSCH 200</td>
<td>Plant Propagation</td>
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<td>Spr</td>
<td>STOCKSCH 234</td>
<td>Irrigation &amp; Drainage</td>
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<td>Spr</td>
<td>STOCKSCH 240</td>
<td>Applied Calculations in Turf Management</td>
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<td>Spr</td>
<td>STOCKSCH 255</td>
<td>Herbaceous Plants</td>
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<td>Spr</td>
<td>STOCKSCH 510</td>
<td>Management &amp; Ecology of Plant Diseases</td>
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<td>Fall</td>
<td>STOCKSCH 515</td>
<td>Microbiology of the Soil</td>
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<td>Fall</td>
<td>STOCKSCH 523</td>
<td>Plant Stress Physiology</td>
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<td>Fall</td>
<td>STOCKSCH 530</td>
<td>Plant Nutrition</td>
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<td>Spr</td>
<td>STOCKSCH 550</td>
<td>Plant Hormones &amp; Applied Plant Physiology</td>
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<td>Spr</td>
<td>STOCKSCH 580</td>
<td>Soil Fertility</td>
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<td>Fall</td>
<td>STOCKSCH 587</td>
<td>Phyto/Bioremediation</td>
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<td>Spr</td>
<td>STOCKSCH 597M</td>
<td>Topics in Turf Pathology</td>
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<td>Fall</td>
<td>SUSTCOMM 335</td>
<td>Plants in Landscape</td>
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Turfgrass Science and Management

Restricted Electives (cont.)

Focus
SELECT BUSINESS OR SCIENCE FOCUS:

1. Business Focus
SELECT FOUR COURSES IN BUSINESS
THESE COURSES SHOULD BE DISTRIBUTED ACROSS FOUR OF THE FIVE CATEGORIES (a-e) BELOW:

a. fall/spr ACCOUNTG 221 Principles of Financial Accounting 3
   OR
   spr RES-ECON 324 Small Business Finance 3
b. fall/spr ECON 103 Introduction to Microeconomics (SB) 4
   OR
   fall/spr ECON 104 Introduction to Macroeconomics (SB) 4
   OR
   fall/spr RES-ECON 102 Introductory Resource Economics (SB) 4
   OR
   c. fall/spr HT-MGT 260 Human Resource Mgt/Hospitality Industry 3
      OR
      fall/spr MANAGMNT 314 Human Resource Management 3
d. fall/spr MANAGMNT 301 Principles of Management 3
e. fall/spr MARKETNG 301 Fundamentals of Marketing 3

2. Science Focus
SELECT FOUR COURSES IN SCIENCE
CHOOSE ONE COURSE FROM EACH CATEGORY (a-d) BELOW:

a. fall/spr BIOLOGY 151 Introductory Biology I (BS) 4
b. fall/spr CHEM 112 General Chemistry-Science (PS) 4
c. spr CHEM 250 Organic Chemistry 3
   OR
   fall/spr CHEM 261 Organic Chemistry 3
d. fall/spr MATH 127 Calculus for the Life & Social Sciences I (R2) 3
   OR
   fall/spr MATH 131 Calculus I (R2) 4

Total Major Requirements 51-56

SUMMARY OF REQUIREMENTS

Total Core Requirements 27-30
Biological Science 8
Chemistry 4
Ecosystems Studies 3-4
Integrative Experience 3
Junior Year Writing 3
Math, Statistics and Reasoning 6-8

Total Major Requirements 51-56
Required Courses 27-29
Restricted Electives 24-27

Grand Total for Turfgrass Science and Management 78-86
COURSE DESCRIPTIONS

STOCKBRIDGE SCHOOL

STOCKSCH 101
Insects & Related Forms
With lab. Introduction to insect recognition, development, damage, and control.
Seven-week course; first 7 weeks of the semester.
2 credits/spring sem

STOCKSCH 104
Plant Nutrients
Functions of mineral nutrients in plants, effects of mineral deficiencies, and sources of these nutrients to prevent or alleviate deficiencies in crop production.
Seven-week course; first 7 weeks of the semester.
Prerequisites: STOCKSCH 105; Stockbridge students only
2 credits/spring sem

STOCKSCH 105 (Gen Ed BS)
Soils
With lab. Interrelationship of soils and higher plants. Physical, chemical, and biological properties of soils. Practical approach to current problems through basic soil principles.
Prerequisite: some knowledge of chemistry
4 credits/both sem

STOCKSCH 107
Turfgrass Insects
Principles and practical methods of controlling turf insect pests.
Prerequisite: STOCKSCH 101 (may be taken concurrently)
2 credits/spring sem

STOCKSCH 108
Introductory Botany
With lab. This introductory botany course covers the unique features of plants, how they function, how they are categorized, and how they fit into the ecosystem. Topics include classification of plants, analysis of cell structure and various plant tissues and organs, and study of sexual and asexual reproduction as well as structure and function of plant systems. In addition, students will develop a basic understanding of the processes of photosynthesis and cellular respiration.
4 credits/fall sem
STOCKSCH 109
Insects of Ornamentals
With lab. The recognition, biology, and control of major insect and mite pests attacking shade trees and woody ornamentals in the northeastern U.S. Emphasis on techniques and knowledge useful to the professional in tree care.
Prerequisite: STOCKSCH 101
3 credits/fall sem

STOCKSCH 111
Introductory Plant Pathology
Seven-week course; first 7 weeks of the semester.
Prerequisites: STOCKSCH 108 or 100-level biology course; Stockbridge students only
2 credits/spring sem

STOCKSCH 118
Introduction to Sustainable Food and Farming
Highly interactive and participatory introduction to the Sustainable Food and Farming major, focused on academic preparation, internships and careers. Especially for first year students and transfers into the major.
Prerequisite: Sustainable Food and Farming majors only
1 credit/fall sem

STOCKSCH 120
Organic Farming and Gardening (Gen Ed BS)
With lab. Introduction to principles of soil fertility and crop management by organic procedures that are contrasted and evaluated against conventional chemical methods of farming.
4 credits/both sem

STOCKSCH 170
Pesticide Certification
Independent preparation for the state pesticide certification examination and licensure. The State Pesticide Exam Study Manual is used and available for purchase either online or at the UMass Extension Bookstore. Exams are given at various times throughout the state. Students must apply to take the exam; applications must be submitted by the deadline date (one week prior to the exam). Refer to www.mass.gov/agr/pesticides or call 617-626-1841 for dates of Massachusetts exams.
Prerequisite: consent of instructor
1 credit/both sem
STOCKSCH 171
**Plagues, Food and People: Ecology of Food and Disease (Gen Ed BS)**
The ecology of major diseases related to food, from ergotism and the Salem Witch Trials to the Irish Potato famine to celiac disease and diabetes. How people, microbes and farming change our health and the environment.
4 credits/spring sem

STOCKSCH 182
**Principles of Pesticide Management**
Topics include state and federal pesticide laws and regulations, pesticides and the environment, handling and storage of pesticides, classes and formulations of pesticides, safety and application equipment, understanding the pesticide label, toxicity, proper calculation and mixing of pesticides, and history of pesticide use. Includes preparation for the Massachusetts Pesticide Core Exam.
2 credits/spring sem

STOCKSCH 186
**Introduction to Permaculture**
Foundation in permaculture history, ethics, principles, design process, and practical applications, rooted in the observation of natural systems. Students are trained to be critical thinkers, observers, and analysts of the world(s) around them and are provided with the tools necessary for designing and inspiring positive change.
3 credits/fall sem

STOCKSCH 190P
**Personal Wellness for Farmers & Gardeners**
Development of skills and understanding for maintaining a healthy lifestyle while being a successful farmer or gardener. Students will learn basic anatomy for safe and sustainable manual labor and practice applying safe body mechanics to typical farming labor tasks.
*Prerequisite: Sustainable Food and Farming majors only*
3 credits/spring sem

STOCKSCH 196
**Independent Study**
Independent work related to some area of the food crops and green industries.
*Prerequisite: consent of instructor*
1-6 credits/both sem

STOCKSCH 197S
**Soils Lab**
For students who have completed STOCKSCH 106, and wish to complete the lab component of STOCKSCH 105 that is required for completing the major or minor in this program.
*Prerequisite: STOCKSCH 106*
1 credit/spring sem
STOCKSCH 198P

Permaculture Gardening at UMass
Students will learn about permaculture basics while maintaining UMass on-campus permaculture demonstration gardens.
1 credit/both sem

STOCKSCH 200

Plant Propagation
With lab. The basic principles and techniques for propagating plants by both sexual and asexual means, including seeds, cuttings, bulbs, and tissue culture. The hormonal and physiological factors affecting rooting, seed dormancy, grafting, budding, and layering.
Prerequisite: STOCKSCH 108 or 100-level biology course
3 credits/fall sem/odd yrs

STOCKSCH 230

Introductory Turfgrass Management
With lab. Basic principles of selecting and managing turfgrass for home lawns, parks, golf courses, and other turf areas. Topics include: climatic adaptation, grass identification, establishment practices, pest control, fertility, environmental stresses, etc.
Prerequisites: STOCKSCH 105 and STOCKSCH 108 (may be taken concurrently)
4 credits/fall sem

STOCKSCH 234

Irrigation & Drainage
Principles of hydraulics and system design for turf and landscapes with an emphasis on golf courses. Irrigation systems, equipment performance, installation practices, operation procedures and troubleshooting. Drainage of sports turf also included.
2 credits/spring sem

STOCKSCH 235

Pruning Fruit Crops
With lab. Theory and practice of pruning deciduous fruit plants/trees. Emphasis on practical, hands-on experience.
2 credits/spring sem

STOCKSCH 240

Applied Calculations in Turf Management
Calculations involving area and volume measurements, fertilizer and pesticide requirements, cost analysis, seed calculations, irrigation calculations, and calculations relating to spreader and sprayer calibrations.
Prerequisite: STOCKSCH 230
2 credits/spring sem
STOCKSCH 255
Herbaceous Plants
Study and identification of herbaceous plants; their uses as ornamental plants for home, park, and business.
Prerequisite: Stockbridge students only
3 credits/spring sem

STOCKSCH 258
Urban Agriculture
Explores innovative production methods and critical social, economic, and environmental dimensions of modern day urban agriculture.
3 credits/spring sem

STOCKSCH 265
Sustainable Agriculture
Exploration of ethical, practical and scientific aspects of agricultural sustainability, including economic, social and environmental impacts of food and farming. Uses systems thinking tools to compare industrial and ecological agriculture.
Prerequisite: Sustainable Food and Farming majors only or consent of instructor
3 credits/fall sem

STOCKSCH 268
Small Farm Husbandry: Cows, Sheep & Goats for Meat Production
With discussion. A farmer’s perspective on the sustainable management of cows, sheep and goats on a small farm. Focus on the planning and management of cows, sheep and goats for meat production. All aspects from breeding to marketing will be addressed.
Prerequisite: Sustainable Food and Farming majors only or consent of instructor
3 credits/spring sem

STOCKSCH 269
Small Farm Husbandry: Pigs & Poultry
With discussion. A farmer’s perspective on the management, production and marketing of poultry and pigs on a small farm. This course will address the advantages of having pigs and poultry and will review basic care, processing options, regulations and marketing.
Prerequisite: Sustainable Food and Farming majors only
3 credits/fall sem

STOCKSCH 275
Turfgrass Physiology & Ecology
First half of the semester: an introduction to basic concepts in agricultural chemistry as related to the growth and culture of turf grasses. Second half: the overall growth and development of grasses, including such areas as soil fertility and mineral nutrition.
Prerequisite: STOCKSCH 230
3 credits/spring sem
STOCKSCH 281
**Topics in Herbalism I**
Introduction to the broad field of herbalism through the eyes of a clinical and community herbalist. Topics include historical overview; comparison of major health models of allopathy and holism, introduction to diverse herbal-based health models (Western, Asian, Indigenous), in-depth information on medicinal plants, plant ID, gathering/growing/preparation skills, diverse tools of an herbalist, food as medicine; ethics, politics, and legalities of herbalism.
2 credits/fall sem

STOCKSCH 286
**Permaculture Design and Practice**
Deepened and applied practice in permaculture design process and techniques. Development of a permaculture design and community engagement process.
*Prerequisites: STOCKSCH 186 (formerly STOCKSCH 197G); Sustainable Food and Farming majors only or consent of instructor*
3 credits/spring sem

STOCKSCH 290W
**Organic Weed Control**
Focus on organic weed control by exploring various systems and approaches to weed management to reduce losses to crop yield and quality.
3 credits/spring sem

STOCKSCH 296
**Independent Study**
Sophomore-level educational project with a faculty member related to some area of the food crops or green industries.
*Prerequisite: consent of instructor*
1-6 credits/both sem

STOCKSCH 296T
**Stockbridge School Teaching Experience**
Students gain experience teaching introductory level (100-200) courses. Students will be expected to demonstrate specific competencies related to labs and assisting students; lead review sessions; gain experience in all aspects of teaching a Stockbridge School class.
*Prerequisites: successful completion of the course and related prerequisites in which the student plans to TA; consent of instructor*
1-2 credits/both sem

STOCKSCH 297AL
**Agricultural Leadership & Community Education**
Focus on learning to work with community groups and schools as a community educator.
*Prerequisite: Sustainable Food and Farming majors only or consent of instructor*
3 credits/fall sem
STOCKSCH 297B
Forest Gardens: Perennial Agriculture for Ecological Regeneration
Focus on deepened understanding of forest gardens, with a focus on northeast temperate climates. Exploration of the resilience and benefits of forest systems and how they could be tweaked for the creation of forest gardens.
3 credits/fall sem

STOCKSCH 298
Practicum
Pre-professional work experience related to some area of the food crops and green industries.
Prerequisite: consent of instructor
1-6 credits/both sem

STOCKSCH 298A
Agricultural Practicum
Description unavailable.
Prerequisite: consent of instructor
1-6 credits/both sem

STOCKSCH 298FS
USDA Farm Services Agency Practicum
Participants work under the direction of USDA Farm Service Agency personnel, provide assistance to the farm loan process, participate in government assistance programs, and work with USDA FSA outreach.
Prerequisite: consent of instructor
1-5 credits/both sem

STOCKSCH 298G
Gardenshare Practicum
Student-led practicum experience utilizing a plot of land on campus to grow edible and ornamental crops. Although offered every semester, specific garden activities depend on the season of the year. Students may enroll more than once for credit.
Prerequisite: consent of instructor
1 credit/fall sem

STOCKSCH 298P
Permaculture Practicum
Hands-on, in-depth experience of how to manage and implement an installation of a permaculture design.
Prerequisite: consent of instructor
1-6 credits/both sem
STOCKSCH 300
Deciduous Orchards Science
With lab. Principles and practices involved in the establishment and management of deciduous orchards.
Prerequisite: STOCKSCH 108 (may be taken concurrently)
3 credits/fall sem/odd yrs

STOCKSCH 305
Small Fruit Production
With lab. Principles and practices governing the establishment and management of small fruit plantings.
Prerequisite: STOCKSCH 108 (may be taken concurrently)
3 credits/fall sem/even yrs

STOCKSCH 310
Principles of Weed Management
With lab. History of weed control; importance of weeds and their relationship to people and the environment; ecology of weeds, competition, persistence and survival mechanisms; reproduction, seed germination, and dormancy; methods of weed control, cultural, biological, chemical, and integrated pest management strategies; classification of herbicides and their selectivity; soil factors affecting herbicide performance, persistence and degradation; application equipment and calibration of sprayers; weed management systems for various crops and non-crop areas.
Prerequisite: STOCKSCH 108 or 100-level biology course
3 credits/fall sem

STOCKSCH 315
Greenhouse Management
With lab. Introduction to the greenhouse environment and the technology used in production of greenhouse crops. Greenhouse experiments in crop production; exercises on greenhouse structures, heating and cooling, growing media, crop nutrition, photoperiod control and lighting, and crop scheduling; field trip to local greenhouses.
Prerequisites: STOCKSCH 108 (may be taken concurrently) or 100-level biology course; Stockbridge students only or consent of instructor
4 credits/fall sem/even yrs

STOCKSCH 320
Organic Vegetable Production
Focus on organic insect, disease, and weed control, greenhouse production and construction, irrigation practices, planting and fertility, harvesting and marketing techniques, as well as how to manage money, people and natural resources.
Prerequisite: Sustainable Food and Farming majors only
3 credits/spring sem/odd yrs
STOCKSCH 326
Insect Biology
With optional lab and field trips. How insects solve their problems of maintenance, survival, reproduction, etc., and how entomologists apply this knowledge in managing them. Topics include insect evolution, plant and insect interactions, biodiversity and conservation of insects, behavior, and insect pest management. Emphasis on various insect models (e.g., Drosophila) as they relate to major research in biology.
3 credits/fall sem

STOCKSCH 335
Principles and Practices of Greenhouse Cultivation
With lab. Greenhouse culture of spring greenhouse crops.
Prerequisites: STOCKSCH 108; Horticultural Science majors only
4 credits/spring sem

STOCKSCH 340
Advanced Turfgrass Management
Management of environmental stress in turfgrass. Special practices in managing high-quality turfgrass areas such as golf courses, athletic fields, and ornamental areas.
Prerequisite: STOCKSCH 275
3 credits/spring sem

STOCKSCH 350
Sustainable Soil & Crop Management
With lab. Maintenance and enhancement of long-term productivity and sustainability of soil in food and feed production. Students will gain an integrated knowledge of soil and crop influences on cropping systems.
Prerequisite: STOCKSCH 105 (may be taken concurrently) or consent of instructor
3 credits/fall sem

STOCKSCH 355
Community Food Systems
With lab. Examines the movement of food from seed to table. Participants explore local and global food systems, and specific food related issues that impact health of communities. Focus on the opportunities and challenges required in making community food projects that create real lasting systems change.
3 credits/fall sem/odd yrs
STOCKSCH 356
Food Justice and Policy
With lab. Focus on the role of policy in determining what we eat, who experiences barriers to access safe, healthy, local foods, and how we create equity and sustainability in our local food system. Basic components of our food system will be discussed: production, distribution, and consumption. Systemic structures of race, class, citizenship and ability as they relate to access to healthy local food will be examined.
Prerequisites: STOCKSCH 265; Sustainable Food and Farming majors only or consent of instructor
3 credits/fall sem/even yrs

STOCKSCH 360
Landscape Plant Production
With lab. Cultural practices of field and container production; how these practices and environmental factors influence nursery crop growth and development. Topics include: site selection, planting and spacing, mineral nutrition, harvesting, irrigation practices, pest management, and overwintering. Basic economic management of nursery crops production and marketing reviewed.
Prerequisites: STOCKSCH 105; SUSTCOMM 335 highly recommended
4 credits/fall sem/odd yrs

STOCKSCH 370
Tropical Agriculture
Tropical regions of the world, their environment and classification; influence of climate, population, and socio-economic conditions on agriculture; major crops and cropping systems of sub-humid tropics; introduction to dry land agriculture; importance of rainfall and irrigation on productivity; green revolution; desertification; present and future research needs of region, and state of agricultural technology.
3 credits/spring sem

STOCKSCH 376
Student Farm Management I
How to formulate a complete production plan for a 20 acre organic vegetable farm through the comprehension of introduced topics and activity. Topics include small farm business development, production planning for established markets, compliance with farm certifications for organic production and food safety regulations, soil health and fertility, and methods for plant production and crop maintenance.
Prerequisites: STOCKSCH 105 and STOCKSCH 398E (taken concurrently)
3 credits/spring sem
STOCKSCH 379

Agricultural Systems Thinking
With discussion. Systems thinking is a way of understanding complex real-world situations such as those often encountered in sustainable food and farming careers. Students will be introduced to systems tools for unraveling complexity and integrating their learning from previous courses and experience. 
Prerequisites: STOCKSCH 265; junior and senior Sustainable Food and Farming majors only or consent of instructor
3 credits/fall sem

STOCKSCH 382

Professional Development in Sustainable Food and Farming
Satisfies the Junior Year Writing requirement for Sustainable Food and Farming majors. Practice and improve writing while clarifying career goals and improving professional communication skills.
Prerequisites: ENGLWRIT 112; Sustainable Food and Farming majors only
3 credits/spring sem

STOCKSCH 384

Introduction to Plant Physiology
Introduction to fundamental concepts of physiological processes governing plant growth and development, from cell to whole plant responses. Blending of concepts from traditional plant physiology and recent research advances to help provide insight on plant growth and function under various environmental conditions.
Prerequisites: STOCKSCH 108 and CHEM 110 or CHEM 111
3 credits/spring sem

STOCKSCH 390A

Plant Biotechnology & Tissue Culture
With lab. Focus on the basic knowledge of plant tissue culture, recombinant DNA and gene expression technology required for transformation and assessment of genetically engineered crops. Students will be introduced to the application of biotechnology to address global food and nutritional security issues and controversies about the genetically modified crops (GMOs).
Prerequisites: BIOLOGY 151 or BIOLOGY 152, and CHEM 111 or CHEM 112
4 credits/spring sem

STOCKSCH 390G

Sustainable Grape Production
With lab. Exploration of grape origins, domestication, and fundamental principles of grape growing, both domestically and globally. Practices specific to the winter such, as pruning, will be included. Seven-week course; first seven weeks of the semester
3 credits/spring sem
STOCKSCH 390N

Ecosystem Processes
The flows of energy, carbon, and nutrients within ecosystems, tracing the key processes that define ecosystem function will be covered. Development of the connections between organisms, abiotic factors and ecosystem processes. The effects of environmental change on ecosystem processes will be highlighted.
Prerequisites: STOCKSCH 105, GEOLOGY 101, or ENVIRSCI 214; CHEM 111 recommended
3 credits/spring sem

STOCKSCH 391B

Turfgrass Science & Management
Practical review of key subjects in turfgrass science and management. Specifically designed to prepare students for National Collegiate Turf Bowl competitions in the areas of golf course and sports turf management. Students from across the country participate in annual competitions to gain recognition for their university’s turf programs and to network with industry professionals.
Prerequisites: STOCKSCH 105, STOCKSCH 107, STOCKSCH 240 and STOCKSCH 275
1 credit/fall sem

STOCKSCH 396

Independent Study
Upper-level project for students who have completed introductory courses in biology/botany, soils and/or entomology.
Prerequisite: consent of instructor
1-6 credits/both sem

STOCKSCH 397GB

Grapevine Biology
With lab. Viticultural practices, culture and grapevine biology related to fall production. Emphasis will be on the challenges and opportunities of the local cold climate and sustainable practices.
Prerequisites: STOCKSCH 105 and STOCKSCH 108 or consent of instructor
3 credits/fall sem

STOCKSCH 397PT

Plant Trends in Landscape Horticulture
Description unavailable.
Prerequisite: STOCKSCH 108
3 credits/fall sem/even yrs

STOCKSCH 397R

Social Permaculture
How to apply permaculture ethics and principles to a variety of social systems. Use of methods and strategies that build capacity and resilience while leading to long term systemic change.
Prerequisite: Sustainable Food and Farming majors only
3 credits/spring sem
STOCKSCH 398
Practicum
Internship or other pre-professional work experience in the field of plant and soil sciences.
Prerequisites: course work in plant biology, soil science, and minimum two mid-level STOCKSCH courses; consent of faculty advisor
1-12 credits/both sem

STOCKSCH 398E
Farm Enterprise Practicum
Guided practicum experience providing students with practical experience in growing crops, as well as managing and marketing these crops in support of their educational goals. Students will develop, use and evaluate crop plans, including all aspects of production and marketing. Practical experience in management of soil fertility, water, and pests using IPM and organic methods. Enrollment limited.
Prerequisites: STOCKSCH 105 and STOCKSCH 376; juniors; consent of instructor
3-6 credits/spring sem

STOCKSCH 398G
Greenhouse Practicum
Focus on greenhouse venting and temperature control, maintaining outdoor gardens, harvesting of floricultural crops, post-harvest handling of floricultural crops, fertilization, propagation (by seed, cuttings, division), greenhouse maintenance, operation of greenhouse equipment (fertilizer injector).
Prerequisite: consent of instructor
1-18 credits/both sem

STOCKSCH 398T
Turf Practicum
Internship or other pre-professional work experience in the field of turfgrass management, including but not limited to golf course management, athletic field maintenance, and professional lawn care.
Prerequisites: STOCKSCH 230; consent of instructor
1-12 credits/both sem

STOCKSCH 476
Student Farm Management II
Practical application of harvesting and marketing techniques used for the sale of organic vegetable crops. Students will complete a financial analysis of the current growing season and make recommendations for the next production cycle.
Prerequisites: STOCKSCH 376; should be taken concurrently with STOCKSCH 498E; consent of instructor
3 credits/fall sem
STOCKSCH 496
Independent Study
Research or other independent upper-level project in plant and soil sciences.
Prerequisites: course work in plant biology, soil science, chemistry, and minimum one upper-level STOCKSCH course; consent of instructor
1-6 credits/both sem

STOCKSCH 496A
Independent Study-Plant Science
Plant science research in laboratory or greenhouse.
Prerequisites: course work in plant biology, soil science, chemistry, and minimum one upper-level STOCKSCH course; consent of instructor
1-6 credits/both sem

STOCKSCH 496B
Independent Study-Soil Science
Soil science research in laboratory or field setting.
Prerequisites: course work in plant biology, soil science, chemistry, and minimum one upper-level STOCKSCH course; consent of instructor
1-6 credits/both sem

STOCKSCH 496C
Independent Study-Teaching Assistant
Assist with instruction/classroom preparation for Stockbridge School courses.
Prerequisites: consent of instructor teaching the course; Independent Study contract; FERPA certification if involved with grading
1-6 credits/both sem

STOCKSCH 496D
Independent Study-Insect Science
Upper-level project for students who have satisfactorily completed minimum one 500-level entomology-related class in addition to foundation course work in biology and/or entomology.
Prerequisite: consent of instructor
1-6 credits/both sem

STOCKSCH 498
Practicum
Internship or other pre-professional work experience in the field of plant and soil sciences.
Prerequisite: consent of instructor
1-12 credits/both sem
STOCKSCH 498E  
Farm Enterprise Practicum II  
Continuation of STOCKSCH 398E. Students maintain crops planted in the spring semester and prepare fields for winter. Students will harvest, clean, store and market their crops.  
Prerequisites: STOCKSCH 398E; should be taken concurrently with STOCKSCH 476; consent of instructor  
1-6 credits/fall sem

STOCKSCH 505  
General Plant Pathology  
With lab. Causes, nature, and control of plant diseases. Diagnosis of plant diseases. Mechanisms, biochemistry, and genetics of plant disease induction, development, and control.  
Prerequisite: STOCKSCH 384 or MICROBIO 310 or 100-level biology course or consent of instructor  
4 credits/fall sem

STOCKSCH 510  
Management & Ecology of Plant Diseases  
The ecology of plant, microbe, and human interactions in plant diseases, from wilderness to industrial farms. Epidemics, traditional farming, environmental impacts and sustainability issues. Ways in which agriculture, particularly plant production and plant disease management, change ecosystems.  
Prerequisite: BIOLOGY 151 or equivalent  
3 credits/spring sem

STOCKSCH 515  
Microbiology of the Soil  
Microbial processes in the soil and sediment environment; ecology of the various microbial communities; decomposition of organic matter, carbon transformation, nitrogen, sulfur, phosphorus and other mineral transformations. Chemistry of these reactions and their biogeochemical implications. Biological equilibrium, the rhizosphere, and microbial associations.  
Prerequisites: CHEM 250 or CHEM 261 and basic biology course  
3 credits/fall sem

STOCKSCH 523  
Plant Stress Physiology  
Advanced course focusing on plant responses to major abiotic stresses. Current research topics in stress physiology will be discussed.  
Prerequisite: STOCKSCH 384 or BIOLOGY 510  
3 credits/fall sem
STOCKSCH 525  
**Mycology**  
Biology, ecology, classification and identification of fungi and fungal-like organisms. Includes consideration of fungi as causes of diseases in animals, humans, and plants, and their uses in biotechnology applications.  
*Prerequisite: BIOLOGY 151*  
4 credits/fall sem/odd yrs

STOCKSCH 530  
**Plant Nutrition**  
With lab. The acquisition, translocation, distribution, and function of the essential inorganic elements in plants. Genetic control of plant nutrition and ecological adaptation to nutritional variables. Diagnosis of plant nutritional disorders.  
*Prerequisites: STOCKSCH 105 and STOCKSCH 108, and either CHEM 110 or CHEM 111 or equivalent courses*  
4 credits/fall sem

STOCKSCH 535  
**Diagnostic Plant Pathology**  
Methods of diagnosing plant diseases caused by fungi, bacteria, viruses, nematodes, and abiotic agents considered using specimens collected by students.  
*Prerequisite: STOCKSCH 505*  
4 credits/spring sem/odd yrs

STOCKSCH 545  
**Postharvest Biology**  
The basic biochemical and physiological processes occurring in fruits, vegetables, and flowers after harvest; postharvest treatments to modify these processes.  
*Prerequisites: STOCKSCH 384 and either CHEM 110 or CHEM 111*  
4 credits/spring sem

STOCKSCH 550  
**Plant Hormones & Applied Plant Physiology**  
The influence of naturally occurring plant hormones on regulating physiology, growth, and development in plants. Uses and potential uses of synthetic plant growth regulators, cultural techniques, and horticultural practices to improve the production of food, fiber and ornamental plants.  
*Prerequisites: STOCKSCH 108 or 100-level biology course; STOCKSCH 384 recommended*  
3 credits/spring sem

STOCKSCH 572  
**Nematology**  
With lab. Biology and identification of soil nematodes. Parasitism of plants and management practices stressed.  
*Prerequisite: STOCKSCH 505 or BIOLOGY 153*  
4 credits/fall sem/even yrs
STOCKSCH 575
Environmental Soil Chemistry
With lab. Fundamental chemical concepts/processes in soils, such as ion exchange, precipitation/dissolution, redox reactions, partitioning and adsorption, and solution speciation and nature of soil minerals and organic matter. Examination of how chemical processes affect fate, transport, availability, and remediation of trace elements, heavy metals and organic contaminants in soils and sediments. Discussion on current environmental issues and problems.
Prerequisites: CHEM 110 or CHEM 111 or consent of instructor; STOCKSCH 105 strongly recommended
4 credits/fall sem

STOCKSCH 580
Soil Fertility
The role of mineral elements in the growth of plants; plant response to fertilizers and other soil amendments; soil reaction, mineral deficiencies and toxicities; environmental impact of soil fertility management practices.
Prerequisites: STOCKSCH 105 and STOCKSCH 108 (or equivalents) and either CHEM 110 or CHEM 111
3 credits/spring sem

STOCKSCH 585
Inorganic Contaminants in Soil, Water, and Sediment
Physical, chemical, and biological factors affecting the fate and transport of inorganic contaminants (including heavy metals) in soil, water and sediment. Sources, chemistry, pedogenic and geochemical behavior of these contaminants and methods used for their analysis. Risk assessment, and remediation technologies, options, and goals.
Prerequisites: CHEM 111 and CHEM 112, knowledge of college algebra, basic soil science, and transition metal chemistry, or consent of instructor
3 credits/spring sem

STOCKSCH 587
Phyto/Bioremediation
Various aspects of phytoremediation - the use of plants (both natural hyper-accumulators and transgenic) and their associated microbes with the purpose of environmental clean-up of contaminated soil, sediments and water. Various strategies for phytoremediation of a wide range of toxic pollutants, both organic and elemental, with special emphasis on toxic metals will be discussed.
Prerequisite: STOCKSCH 384, BIOLOGY 151, or BIOLOGY 152
3 credits/fall sem
STOCKSCH 590M
Microbe-Mineral-Organic Matter Interactions in Soils
Fundamental interactions between microbes, minerals, and organic matter responsible for carbon cycling, mineral weathering, and nutrient dynamics in soils. Examination of the importance of these interactions for soil development, carbon storage, and fertility.
Prerequisites: STOCKSCH 105 and either CHEM 110 or CHEM 111; STOCKSCH 575, CHEM 261, MICROBIO 310 recommended
3 credits/spring sem

STOCKSCH 591A
Plant Biotech Journal Club
Open to both graduate students and advanced undergraduate students who have an interest in reviewing the current scientific literature in the field of plant biotechnology.
1 credit/both sem

STOCKSCH 597M
Topics in Turf Pathology
Review and discussion of concepts and issues related with turfgrass diseases. Reading of scientific papers and trade journals required each week. Guest speakers from turfgrass industry present many of the topics and lead subsequent class discussion.
Prerequisite: STOCKSCH 505
3 credits/spring sem
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<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Event</th>
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<tbody>
<tr>
<td>September 3</td>
<td>Tuesday</td>
<td>First day of classes</td>
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<tr>
<td>September 16</td>
<td>Monday</td>
<td>Last day to ADD or Drop any class with no record</td>
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<tr>
<td>October 14</td>
<td>Monday</td>
<td>Holiday (Columbus Day)</td>
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<tr>
<td>October 15</td>
<td>Tuesday</td>
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<tr>
<td>October 29</td>
<td>Tuesday</td>
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<tr>
<td>November 4</td>
<td>Monday</td>
<td>Registration begins for Spring 2020</td>
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<tr>
<td>November 11</td>
<td>Monday</td>
<td>Holiday (Veterans’ Day)</td>
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<tr>
<td>November 13</td>
<td>Wednesday</td>
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<tr>
<td>November 24</td>
<td>Sunday</td>
<td>Thanksgiving recess begins</td>
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<tr>
<td>December 2</td>
<td>Monday</td>
<td>Classes resume</td>
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<tr>
<td>December 11</td>
<td>Wednesday</td>
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<tr>
<td>December 12</td>
<td>Thursday</td>
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<td>Last day of final examinations</td>
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<tr>
<td>December 20</td>
<td>Friday</td>
<td>Snow day for exams; semester ends</td>
</tr>
<tr>
<td>January 2</td>
<td>Thursday</td>
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Number of class meetings: MTuWThF: 13

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<td>February 18</td>
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<td>March 15</td>
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<td>March 23</td>
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<td>Classes resume</td>
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<tr>
<td>March 24</td>
<td>Tuesday</td>
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<tr>
<td>March 30</td>
<td>Monday</td>
<td>Registration begins for Fall 2020</td>
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<tr>
<td>April 20</td>
<td>Monday</td>
<td>Holiday (Patriot’s Day)</td>
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<td>April 22</td>
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<td>May 1</td>
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<tr>
<td>May 7</td>
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<tr>
<td>May 8</td>
<td>Friday</td>
<td>Commencement</td>
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<tr>
<td>May 12</td>
<td>Tuesday</td>
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Number of class meetings: MTuWThF: 13