### AGRONOMY (AGRO)

**AGRO 801 Biology of Plant Pathogens**
Crosslisted with: PLPT 801, HORT 801  
**Prerequisites:** PLPT 369 or equivalent; an introduction to biochemistry course  
**Description:** Molecular and cellular approach to the study of plant pathological principles.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

**AGRO 802 Ecology and Management of Plant Pathogens**
Crosslisted with: PLPT 802, HORT 802  
**Prerequisites:** PLPT 369 or equivalent; an introduction to biochemistry course  
**Description:** Principles of plant disease epidemiology and disease control through cultural, biological, chemical and host plant resistance strategies.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

**AGRO 803 Scientific Writing and Communication**
Crosslisted with: AGRO 403, HORT 403, HORT 803  
**Prerequisites:** Senior standing or higher, an ACE 1 written communication course, an ACE 2 oral communication course, and permission of instructor.  
**Description:** Reading and critiquing, writing, and presenting scientific information. Use research data to compose a manuscript in standard scientific format, and prepare and present a poster to a general audience. Ethical issues in research and writing.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

**AGRO 806 Plant Ecophysiology: Theory and Practice**
Crosslisted with: HORT 406, HORT 806, NRES 406, NRES 806, AGRO 406  
**Prerequisites:** Junior standing; 4 hrs ecology; and 4 hrs botany or plant physiology.  
**Description:** Principles of plant physiology which underlie the relationship between plants and their physical, chemical and biotic environments. An introduction to the ecological niche, limiting factors and adaptation. An overview of the seed germination and ecology, plant and soil water relations, nutrients, plant energy budgets, photosynthesis, carbon balance and plant-animal interactions. An introduction to various field equipment used in ecophysiological studies.  
**Credit Hours:** 4  
**Max credits per semester:** 4  
**Max credits per degree:** 4  
**Format:** LEC

**AGRO 807 Plant-Water Relations**
Crosslisted with: BIOS 817, NRES 807  
**Prerequisites:** AGRO 325 or equivalent; MATH 106 recommended  
**Description:** Quantitative study of water relations in the soil-plant-atmosphere system. Basic physical processes, which describe the movement of water in the soil and the atmosphere, and the physiological processes, which describe water movement inside of the plant. Stomata physiology and the effects of internal water deficits on photosynthesis, respiration, nitrogen metabolism, cell division and cell enlargement. Results from integrative models used to study the relative importance of environmental versus physiological factors for several plant-environment systems.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

**AGRO 808 Microclimate: The Biological Environment**
Crosslisted with: AGRO 408, GEOG 408, HORT 408, METR 408, NRES 408, WATS 408, GEOG 808, HORT 808, METR 808, NRES 808  
**Prerequisites:** Junior standing, MATH 106 or equivalent, 5 hrs physics, major in any of the physical or biological sciences or engineering; or permission.  
**Description:** Physical factors that create the biological environment. Radiation and energy balances of earth’s surfaces, terrestrial and marine. Temperature, humidity, and wind regimes near the surface. Control of the physical environment through irrigation, windbreaks, frost protection, manipulation of light, and radiation. Applications to air pollution research. Instruments for measuring environmental conditions and remote sensing of the environment.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Groups:** Physical Geography

**AGRO 809A Case studies in plant breeding: Breeding for Disease Resistance**
Crosslisted with: AGRO 409A, HORT 409A, HORT 809A  
**Description:** The application of fundamental genetics principles in inheritance, gene mapping and DNA analysis to decision making by plant breeders with the goal of improving disease resistance in crop cultivars. Learning is structured by the genetics discovery story told in published research articles and the thinking process of plant breeders who will use these discoveries in their work.  
**Credit Hours:** 1  
**Max credits per semester:** 1  
**Max credits per degree:** 1  
**Format:** LEC

**AGRO 809B Case Studies in plant breeding: Transgenic strategies for disease resistance**
Crosslisted with: AGRO 409B, HORT 409B, HORT 809B  
**Description:** The application of basic science and technology by plant genetic engineering experts with the goal of teaming with plant breeders to improve disease resistance in crop cultivars. Learning is structured by the genetics discovery story told in published research articles and the thinking process of genetic engineers and plant breeders who will use these discoveries in their work.  
**Credit Hours:** 1  
**Max credits per semester:** 1  
**Max credits per degree:** 1  
**Format:** LEC
AGRO 810 Plant Molecular Biology  
Crosslisted with: BIOC 810, BIOS 810, HORT 810  
Prerequisites: AGRO 215 or BIOS 206; BIOC 831 or permission  
Description: Molecular genetic basis of biological function in higher plants. Genome organization, gene structure and function, regulation of gene expression, recombinant DNA, and genetic engineering principles. Material taken primarily from current literature.  
Credit Hours: 3  
Max credits per semester: 1  
Max credits per degree: 1  
Format: LEC

AGRO 811 Crop Genetic Engineering  
Crosslisted with: AGRO 411  
Description: Basic steps required to produce genetically engineered crops. Genetic engineering procedures used to develop current crops and innovations that will lead to future products. Genetic engineering process and predicting how changes in different steps of the process influence the final crop. Application of genetic engineering technology to plan the development of new genetically engineered crops.  
Credit Hours: 2  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGRO 812 Crop and Weed Genetics  
Crosslisted with: AGRO 412  
Notes: A previous class in Genetics is highly recommended.  
Description: Application of classical and molecular genetic principles to the explanation of variation observed in plant families and populations. Interpretation of information gathered from whole plant trait observation and from molecular analysis. Relationships between crops and weeds. Examples from genetic studies on both crop and weed species are the basis of course.  
Credit Hours: 2  
Max credits per semester: 2  
Max credits per degree: 2  
Format: LEC

AGRO 813 Turfgrass and Landscape Weed Management  
Crosslisted with: HORT 813, TLMT 813  
Description: Fundamental terminology associated with turfgrass and landscape weed management. Weed identification and the cultural practices and herbicide strategies to limit weed invasion and persistence.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 1  
Format: LEC

AGRO 814 Turfgrass Disease Management  
Crosslisted with: AGRO 414, HORT 414, HORT 814, PLPT 414, PLPT 814, TLMT 414, TLMT 814  
Prerequisites: BIOS/PLPT 369 or one semester of introductory plant pathology.  
Description: Pathogens, epidemiology, and control of diseases specific to turfgrass.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 1  
Format: LEC

AGRO 815A Self-pollinated Crop Breeding  
Crosslisted with: ENTO 815A  
Prerequisites: AGRO 215  
Description: Self-pollinated plant breeding theory and methods. Pedigree, bulk, single seed descent, back-crossing methods and inbreeding theory.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 1  
Format: LEC  
Prerequisite for: AGRO 815B; AGRO 815E

AGRO 815B Germplasm and Genes  
Crosslisted with: ENTO 815B  
Prerequisites: AGRO 215  
Description: Obtaining germplasm and genes from cultivated plants, wild relatives of cultivated plants, and the biosphere. Origination of crops, mutation genetics, biotechnology as a source of genes, chromosomal engineering and plant reproduction.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 1  
Format: LEC  
Prerequisite for: AGRO 815B; AGRO 815E

AGRO 815D Cross-pollinated Crop Breeding  
Crosslisted with: ENTO 815D  
Prerequisites: AGRO 215  
Description: Cross-pollinated breeding theory and methods. Genes in populations, recurrent selection methods, creating populations, hybrid production practices, and population improvement theory.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 1  
Format: LEC  
Prerequisite for: AGRO 815B; AGRO 815E

AGRO 816A Heterosis  
Description: Classical concepts of heterosis; genetic hypotheses for hybrid vigor; quantitative genetics of heterosis; new tools to study hybrid vigor; structure and function; organization of germplasm into heterotic groups; prediction of heterosis and hybrid performance; mechanisms for making hybrid seed; and breeding methods/concepts for developing hybrids in plants.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 1  
Format: LEC

AGRO 815B Haploids and Doubled Haploids in Plant Breeding  
Prerequisites: AGRO 815A, B, and D or permission  
Description: Variations in chromosome number, biology and technology of haploids/doubled haploids in higher plants, microspore embryogenesis, wide hybridizations, in vivo mazie parthenogenesis-type, and radiation systems. Use of haploids in genetics research, DH systems in self-pollinated, cross-pollinated, and hybrid crop breeding.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 1  
Format: LEC
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Description</th>
<th>Credit Hours</th>
<th>Max credits per semester</th>
<th>Max credits per degree</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRO 816E</td>
<td>Genotype by Environment Interaction</td>
<td>AGRO 815A, B, and D, STAT 801, 802 or equivalent course work or permission</td>
<td>Types and causes of phenotype instability due to impacts of environmental factors. Topics include adaptation, impacts of G x E on selection and testing, selection of evaluation environments. Statistical concepts to describe model interactions, breeding for reliability across unpredictable environments, precision phenotyping, selection for specific stresses, use of QTL's for abiotic and biotic stress stability.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>LEC</td>
</tr>
<tr>
<td>AGRO 817</td>
<td>Plant Pathology Principles and Application</td>
<td>12 hours of prior coursework in the plant sciences</td>
<td>Introduction to the biology of plant pathogenic organisms; pathogen-plant interactions; environmental influences; cultural, resistance, and chemical strategies for plant disease management.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>LEC</td>
</tr>
<tr>
<td>AGRO 818</td>
<td>Agricultural Biochemistry</td>
<td>Undergraduate major in life sciences or related area, and a course in biochemistry</td>
<td>A Web-based course. Biochemical underpinnings of agricultural production and processing systems. Agricultural biotechnology; bioenergetics; kinetics and enzyme regulation; interaction of biomolecules with light, photosynthesis and the balance between anabolism and catabolism in microbes, plants and animals.</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>IND</td>
</tr>
<tr>
<td>AGRO 819</td>
<td>Applications of Remote Sensing in Agriculture and Natural Resources</td>
<td>AGRO 419, GEOG 419, GEOI 419, NRES 420, GEOG 819, GEOI 819, NRES 820</td>
<td>Introduction to the practical uses of remote electromagnetic sensing in dealing with agricultural and water-resources issues.</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>LEC, IND</td>
</tr>
<tr>
<td>AGRO 821</td>
<td>Learning Biotechnology</td>
<td>HORT 821</td>
<td>Investigate biotechnology and its application in solving problems and connect biotechnology to basic science concepts in biology and chemistry. Integrate individually-designed biotechnology lessons into learning standards.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>LEC</td>
</tr>
<tr>
<td>AGRO 824</td>
<td>Plant Nutrition and Nutrient Management</td>
<td>AGRO 325 or basic course in plant physiology. A course in organic chemistry or biochemistry recommended</td>
<td>Macro and micro nutrient elements and their function in the growth and development of plants. Role of single elements. Interaction and/or balances between elements and nutrient deficiency and/or toxicity symptoms as they affect the physiology of the whole plant. Relationship between crop nutrition and production and/or environmental considerations (e.g. yield, drought, temperature, pests).</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>LEC</td>
</tr>
<tr>
<td>AGRO 826</td>
<td>Invasive Plants</td>
<td>AGRO 426, HORT 426, HORT 826, NRES 426, NRES 826</td>
<td>Principles of invasive plant management by preventative, cultural, biological, mechanical and chemical means using an adaptive management framework. Herbicide terminology and classification, plant-herbicide and soil-herbicide interactions, equipment calibration and dosage calculations.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>LEC</td>
</tr>
<tr>
<td>AGRO 827</td>
<td>Turfgrass Systems Management</td>
<td>AGRO 427, HORT 427, TLMT 427, HORT 827, TLMT 827</td>
<td>Critical evaluation of turfgrass settings to create economical and environmentally friendly management systems for professionally managed turf areas.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>LEC</td>
</tr>
</tbody>
</table>

**Groups**: Techniques

**Notes**: Offered spring semesters.
AGRO 831 Spatial Variability in Soils
Prerequisites: AGRO/SOIL 366 and STAT 801.
Notes: Offered spring semester of even-numbered years.
Description: Basic concepts of soil variability, its underlying causes. The impact spatial variability has on soil management, primarily for crop production. Geographical and geo-statistical concepts. Use of spatial information for more profitable crop production.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC

AGRO 832 Learning Plant Science
Crosslisted with: HORT 832
Description: The biology of plants grown for food, fiber, fuel and fun. Connect applied plant science to basic science concepts in biology and chemistry. Integrate individually-designed plant science lessons into learning standards.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 834 Plant Biochemistry
Crosslisted with: AGRO 434, BIOC 434, BIOS 434, CHEM 434, BIOC 834, BIOS 834, CHEM 834
Prerequisites: BIOC/BIOS/CHEM 431/831.
Description: Biochemical metabolism unique to plants. Relationships of topics previously acquired in general biochemistry to biochemical processes unique to plants. Biochemical mechanisms behind physiological processes discussed in plant or crop physiology.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 835 Agroecology
Crosslisted with: AGRO 435, HORT 435, NRES 435, NRES 835
Prerequisites: For AGRO/HORT/NRES 435: Senior standing or permission. For AGRO/NRES 835: 12 hrs biological or agricultural sciences or permission.
Description: Integration of principles of ecology, plant and animal sciences, crop protection, and rural landscape planning and management for sustainable agriculture. Includes natural and cultivated ecosystems, population and community ecology, nutrient cycling, pest management, hydrologic cycles, cropping and grazing systems, landscape ecology, biodiversity, and socioeconomic evaluation of systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 836 Agroecosystems Analysis
Crosslisted with: AGRO 436, HORT 436, HORT 836
Prerequisites: Senior standing.
Description: Analysis of production, economics, environmental impacts, and social integration aspects of farms and farming systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: FLD

AGRO 837 Animal, Food and Industrial Uses of Grain
Crosslisted with: AGRO 437
Prerequisites: CHEM 105 or 109, and one of the following: AGRO 204 or ASCI 250.
Description: Identification and comparison of grain quality characteristics desired by livestock feeders, human food processors and industrial users, and methods used to measure these characteristics.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC

AGRO 838 Producing Grain for Animal, Food and Industrial Uses
Crosslisted with: AGRO 438
Prerequisites: CHEM 109 and one of the following: AGRO 204 or ASCI 250.
Notes: AGRO 215 and 437/837 recommended. AGRO 215 and 437/837 recommended.
Description: Genetic development, production practices, and grain handling and storage procedures to deliver quality grain to livestock feeders, human food processors and industrial uses.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGRO 839 Organic Farming and Food Systems
Crosslisted with: AGRO 439, HORT 439, HORT 839
Prerequisites: Admission to the MS or PhD program
Description: History of organic farming and horticultural systems, organic certification, nutrient and pest management in organic systems, planning organic enterprises including production and marketing, resilience of organic systems in ecological, economic, and social terms; future issues and potentials of organic food systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 840 Great Plains Ecosystem
Crosslisted with: AGRO 440, NRES 840, RNGE 440, NRES 440
Prerequisites: Junior standing. BIOS 101 and 101L, or equivalent, recommended.
Description: Characteristics of Great Plains ecosystems, interrelationships of ecological factors and processes, and their application in the management of grasslands. Interactions of fire, vegetation, grazing animals and wildlife.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 841 Perennial Plant Function, Growth, and Development
Crosslisted with: AGRO 441, HORT 441, HORT 841, RNGE 441
Prerequisites: AGRO 325 or equivalent.
Description: Principles of crop physiology and developmental morphology in relation to function, growth, development, and survival of perennial forage, range, and turf plants. The relationship of physiology and morphological development on plant use and management.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
AGRO 842 Wildland Plants
Crosslisted with: AGRO 442, NRES 842, RNGE 442, NRES 442
Prerequisites: Junior standing, BIOS 101 and 101L, or equivalent, recommended.
Description: Wildland plants that are important to grassland and shrubland ecosystem management and production. Distribution, utilization, classification, identification (including identification by vegetative parts), uses by Native Americans, and recognition of grasses, forbs, shrubs, exotic and wetland plants.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 843 Ecology of Invasive Species
Description: Ecological principles and their application to invasive species. Discussion of population level characteristics and community and ecosystem level effects of a wide variety of taxa including invasive microbial, fungal, plant, invertebrate, and vertebrate examples. Current global consequences and governmental policies/programs designed to limit the spread of invasives.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 844 Ecosystem Monitoring and Assessment
Crosslisted with: AGRO 444, NRES 844, RNGE 444, NRES 444
Prerequisites: Junior standing, NRES 220 or equivalent, recommended.
Description: Measurement and monitoring of the important vegetation and environmental factors used to develop management guidelines in grasslands, savannas, woodlands, and wetlands. Emphasis on using ecosystem monitoring protocols for assessment of wildlife habitat, fuels management for wild-land fire, livestock production, and watershed function. Requires field sampling and travel to local field sites.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 845 Livestock Management on Range and Pasture
Crosslisted with: AGRO 445, ASCI 451, ASCI 851, RNGE 445
Prerequisites: ASCI 250 and AGRO 240 or 340; AECN 201 recommended.
Description: Analyzing the plant and animal resources and economic aspects of pasturage. Management of pasture and range for continued high production emphasized.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 846 Forage Quality
Crosslisted with: ASCI 824
Prerequisites: AGRO/RNGE 240 and ASCI 320, or equivalents; 3 cr hrs of introductory statistics; and permission
Description: The chemical characteristics of forage components. The interactions with ruminant physiology and digestion that influence forage feeding value. The laboratory procedures used to evaluate forages for grazing livestock.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: IND

AGRO 847 Grassland Fire Ecology
Prerequisites: BIOS 101 and 101L, or equivalent, recommended
Description: Ecological effects of fire on grassland ecosystems. Insight into the history of fires, the people who use them and why, the parts of a fire, how fires behave in relation to fuel and weather, and the conducting and safety of prescribed burns
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 848 Grassland Monitoring and Assessment
Prerequisites: BIOS 101 and 101L; and AGRO 240, or their equivalents, recommended.
Description: Vegetation sampling theory and plot selection. Quantitative measures used in vegetation analysis, root growth, and utilization. Similarity index, health, and trend for grassland monitoring and assessment. Use of basic statistics and the microcomputer to analyze data sets comparing methods for determination of biomass, basal cover, frequency, and density.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC

AGRO 849 Watershed Management in Grasslands
Prerequisites: BIOS 101 and 101L; NRES 220; and AGRO 240, or their equivalents, recommended
Description: Management of physical/biological settings and processes along with human activities on water and watersheds considering preventative and restorative strategies in a natural resource range-land setting.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 850 Climate and Society
Crosslisted with: AGRO 450, GEOG 450, METR 450, NRES 452, GEOG 850, METR 850, NRES 852
Prerequisites: METR 100 or NRES 370 or equivalent.
Description: Impact of climate and extreme climatic events on society and societal responses to those events. Global in scope and interdisciplinary.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Physical Geography

AGRO 851 Grassland Plant Identification
Prerequisites: BIOS 101 and 101L; and AGRO 240, or their equivalents, recommended
Description: Study of plants that have ecological and/or agricultural importance in the Great Plains. Plant identification, grassland ecosystems and plants forage value, palatability, and utilization by both domestic livestock and wildlife. Cultural and historical uses of grassland.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC
AGRO 855 Soil Chemistry and Mineralogy

**Description:** Chemical and mineralogical properties of soil components. Inorganic colloidal fraction. Structures of soil minerals as a means of understanding properties, such as ion exchange and equilibria; release and supply of nutrient and toxic materials; and soil acidity and alkalinity.

**Prerequisites:** CHEM 221 or 251; or equivalent.

**Crosslisted with:** AGRO/HORT/SOIL 153 or equivalent; GEOL 101; CHEM 109 and 110; CHEM 221 or 251; or equivalent.

**Format:** LEC

AGRO 858 Soil Physical Determinations

**Crosslisted with:** AGRO 458, NRES 458, NRES 858, SOIL 458

**Prerequisites:** SOIL/AGRO/GEOL/WATS 361; PHYS 141 or equivalent; MATH 102 or 103.

**Description:** Survey of measurement techniques and principles used in characterizing the physical properties of soils. Includes analysis of experimental design and sources of experimental error. Techniques include: particle size analysis, soil water content, pore size analysis, field sampling techniques, soil strength, and saturated hydraulic conductivity.

**Format:** LAB

AGRO 860 Soil Microbiology

**Crosslisted with:** AGRO 460, BIOS 447, NRES 460, SOIL 460, BIOS 847, NRES 860

**Prerequisites:** One semester microbiology; one semester biochemistry or organic chemistry.

**Description:** Soil from a microbe's perspective—growth, activity and survival strategies; principles governing methods to study microorganisms and biochemical processes in soil; mechanisms controlling organic matter cycling and stabilization with reference to C, N, S, and P; microbial interactions with plants and animals; and agronomic and environmental applications of soil microorganisms.

**Format:** LEC

AGRO 861 Soil Physics

**Crosslisted with:** AGRO 461, GEOL 461, NRES 461, SOIL 461, WATS 461, GEOL 861, NRES 861

**Prerequisites:** AGRO/SOIL 153; PHYS 141 or equivalent, one semester of calculus.

**Description:** Principles of soil physics. Movement of water, air, heat, and solutes in soils. Water retention and movement, including infiltration and field water regime. Movement of chemicals in soils.

**Credit Hours:** 3

**Format:** LEC

AGRO 869 Bio-Atmospheric Instrumentation

**Crosslisted with:** AGRO 469, GEOG 469, HORT 407, METR 469, MSYM 469, NRES 469, GEOG 869, HORT 807, METR 869, MSYM 869, NRES 869

**Prerequisites:** Junior standing; MATH 106; 4 hrs physics; physical or biological science major.

**Description:** Discussion and practical application of principles and practices of measuring meteorological and related variables near the earth's surface including temperature, humidity, precipitation, pressure, radiation and wind. Performance characteristics of sensors and modern data collection methods are discussed and evaluated.

**Credit Hours:** 3

**Format:** LEC

AGRO 872 Applied Soil Physics

**Crosslisted with:** AGRO 472, NRES 472, NRES 872, SOIL 472, WATS 472

**Prerequisites:** AGRO/HORT/SOIL 153 or equivalent; MATH 104 or MATH 106 or equivalent.

**Description:** Emphasis on applied soil physics. Discussion of theoretical principles followed by field and laboratory exercises and applications. Fluxes of water, solutes, air, and heat through the soil. Emphasis on water infiltration, water retention, other soil hydraulic properties. Components of soil water balance. Management of soil water.

**Credit Hours:** 3

**Format:** LEC

AGRO 875 Water Quality Strategy

**Crosslisted with:** NRES 475, NRES 875, SOCI 475, SOCI 875, SOIL 475, WATS 475, AGRO 475, AGRO 875, CIVE 475, CIVE 875, CRPL 875, CRPL 875, GEOL 475, GEOL 875, MSYM 475, MSYM 875, POLS 475, POLS 875

**Prerequisites:** Senior standing or permission.

**Notes:** Capstone course.

**Description:** Holistic approach to the selection and analysis of planning strategies for protecting water quality from nonpoint sources of contamination. Introduction to the use of methods of analyzing the impact of strategies on whole systems and subsystems; for selecting strategies; and for evaluating present strategies.

**Credit Hours:** 3

**Format:** LEC

**Groups:** American Government&Public Pol
AGRO 880 Modified Rootzones
Crosslisted with: AGRO 480, HORT 480, TLMT 480, TLMT 880, HORT 880
Description: Modified rootzones and their applications in the turfgrass and landscape management industry. Correct applications and construction techniques. Offered as a five-week course.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGRO 884 Water Resources Seminar
Crosslisted with: AGRO 484, GEOG 484, GEOL 484, NRES 484, WATS 484, NRES 884, GEOG 884, GEOL 884, WATS 884
Prerequisites: Junior or above standing, or permission.
Description: Seminar on current water resources research and issues in Nebraska and the region.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGRO 888 Business Management for Agricultural Enterprises
Crosslisted with: HORT 488, HORT 888, EAEP 488, AGRO 488, ENTR 488, EAEP 888, ENTR 888
Prerequisites: Junior or above standing, or permission.
Description: Research a specific agricultural enterprise. Develop and present a business plan using materials from the primary area of interest. HORT 488/888 requires the completion of a shadowing assignment and the analysis of case studies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 889 Urbanization of Rural Landscapes
Crosslisted with: AGRO 489, CRPL 489, HORT 489, HORT 889, CRPL 889
Prerequisites: Senior standing, graduate standing, or permission.
Description: Development converts rural landscapes into housing, roads, malls, parks, and commercial uses. This process fragments landscapes and changes ecosystem functions, drives up land prices, and pushes agriculture into more marginal areas. This multi-disciplinary, experiential course guides students in learning about the urbanization process, the impacts on landscapes, people, and the community, and the choices that are available to informed citizens.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 894 Graduate Degree Project Credits
Crosslisted with: HORT 894
Prerequisites: Admission to Master of Agronomy or Horticulture degree program
Description: Design, develop and complete a project that requires synthesis of the course topics covered in the primary area of emphasis.
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 12
Format: IND

AGRO 896 Independent Study
Crosslisted with: AGRO 496, RNGE 496, SOIL 496
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 12
Format: IND

AGRO 897 Master of Applied Science Project
Crosslisted with: AGRI 897, HORT 897, NRES 897
Prerequisites: Admission to Master of Applied Science degree program
Notes: Project activity for the Master of Applied Science degree.
Description: Design, develop and complete a project that requires synthesis of the course topics covered in the primary area of emphasis.
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 6
Format: IND

AGRO 899 Masters Thesis
Prerequisites: Admission to master degree program and permission of major adviser.
Notes: P/N only.
Credit Hours: 1-10
Min credits per semester: 1
Max credits per semester: 10
Max credits per degree: 99
Format: IND

AGRO 906 Crop Growth and Yield Modeling
Crosslisted with: NRES 906
Prerequisites: AGRO 325/HORT 325 Introductory Plant Physiology or equivalent; Recommended: AGRO 406/806 NRES 406/806 HORT 406/806 Plant Ecophysiology or equivalent.
Description: Understanding and use of crop simulation models and ability to build crop models. Studying principles and quantitative descriptions of crop production ecology. Offered fall semester of odd-numbered calendar years.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 907 Agricultural Climatology
Crosslisted with: HORT 907, METR 907, NRES 907
Prerequisites: NRES 808; STAT 801 or equivalent
Description: Offered spring semester of odd-numbered calendar years. Analysis and use of climatological data as applied to agricultural activities and the use of climatological information to assist in decision making.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
AGRO 919 Plant Genetics  
**Crosslisted with:** HORT 919  
**Prerequisites:** AGRO 215  
**Description:** Focus student learning on principles related to mendelian, population, and molecular genetics of plants including allelisms, nonallelic gene interaction, linkage and recombination, mode of inheritance, mutation, epigenetics, DNA-based makers and mapping techniques, inheritance of qualitative and quantitative traits, and plant transformation.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

AGRO 920 Xenobiotics in the Environment  
**Crosslisted with:** ENTO 920, EOHT 920, HORT 920, NRES 920  
**Prerequisites:** Recommend one course each in organic chemistry, soil science, biochemistry, plant physiology, microbiology and ecology  
**Description:** Fate and ecotoxicological impacts of biologically foreign compounds in soil-water-plant environments; uptake, mechanisms of toxicity and metabolism in plants and other biota. Herbicides and other pesticides.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

AGRO 931 Population Genetics  
**Crosslisted with:** ASCI 931, HORT 931  
**Prerequisites:** AGRO 215 and STAT 801  
**Description:** Structure of populations, forces affecting gene frequency and frequency of genotypes, continuous variation, population values and means, genotypic and environmental variances and covariances.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Prerequisite for:** AGRO 932, STAT 847; ASCI 944, STAT 844

AGRO 932 Biometrical Genetics and Plant Breeding  
**Crosslisted with:** STAT 847  
**Prerequisites:** AGRO 931  
**Notes:** STAT 802 recommended. Offered odd-numbered calendar years.  
**Description:** Theoretical concepts involved in planning breeding programs for the improvement of measurable morphological, physiological, and biochemical traits that are under polygenic control in crop plants of various types.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

AGRO 940 Forage Evaluation  
**Crosslisted with:** ASCI 924  
**Prerequisites:** Permission  
**Description:** Offered even-numbered calendar years. Analytic procedures and research methods used in evaluating biochemical components and nutritive value of forages. An evaluation of the impact of forage quality on forage breeding and animal performance.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

AGRO 955 Solute Movement in Soils  
**Crosslisted with:** AGEN 955, CIVE 955, GEOL 985  
**Prerequisites:** MATH 208; AGRO 861 or GEOL 888 or MSYM 852 or CIVE 858  
**Description:** Examination of the theory and experimental evidence available to characterize the movement of chemicals in soil. Both saturated and unsaturated flow conditions examined. Initial presentation of basic theoretical concepts. Remainder of class a discussion of the literature.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

AGRO 963 Genetics of Host-Parasite Interaction  
**Crosslisted with:** BIOS 963, HORT 963, PLPT 963  
**Prerequisites:** BIOS 820; and permission  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

AGRO 965 Plant Virology  
**Crosslisted with:** BIOS 965, PLPT 965, HORT 965  
**Prerequisites:** PLPT *801 or *802; and permission  
**Description:** Virus molecular biology; virosphere; virus-vector relationships; plant resistance to virus infection economic impact and control of plant diseases by viruses.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

AGRO 968 Seminar in Plant Pathology  
**Crosslisted with:** BIOS 968, PLPT 968, HORT 968  
**Prerequisites:** Permission  
**Credit Hours:** 1  
**Max credits per semester:** 1  
**Max credits per degree:** 1  
**Format:** LEC

AGRO 991 Seminar Presentation and Evaluation  
**Crosslisted with:** HORT 991  
**Description:** Various topics in horticulture, agronomy or related subjects. Emphasis on techniques.  
**Credit Hours:** 1  
**Max credits per semester:** 1  
**Max credits per degree:** 2  
**Format:** LEC

AGRO 992 General Seminar  
**Crosslisted with:** HORT 992, NRES 992  
**Description:** Expected of all Agronomy and Horticulture graduate students. Presentation of thesis/dissertation or non-thesis topics in agronomy, horticulture or related subjects. Agronomy and Horticulture PhD students should enroll in this course twice.  
**Credit Hours:** 1  
**Max credits per semester:** 1  
**Max credits per degree:** 5  
**Format:** LEC
AGRO 996 Research in Crops

Prerequisites: 12 hrs agronomy or closely related sciences and permission
Credit Hours: 2-5
Min credits per semester: 2
Max credits per semester: 5
Max credits per degree: 5
Format: IND

AGRO 996A Research in Soils

Crosslisted with: NRES 996A
Prerequisites: 12 hrs AGRO or closely related sciences, and permission
Credit Hours: 2-5
Min credits per semester: 2
Max credits per semester: 5
Max credits per degree: 5
Format: IND

AGRO 999 Doctoral Dissertation

Crosslisted with: HORT 999
Prerequisites: Admission to doctoral degree program and permission of supervisory committee chair.
Credit Hours: 1-24
Min credits per semester: 1
Max credits per semester: 24
Max credits per degree: 99
Format: IND