

**AGRONOMY****Office:** Science and Math Building 178, 537-6141**Faculty:** Dr. Grace Armah-Agyeman**Department:** Science

The SMSU Agronomy Program prepares students for careers in many crop production and natural resource conservation roles. SMSU Agronomy graduates would seek employment in wide variety of areas such as: crop management consulting, agronomists or technical representatives for seeds, agricultural chemicals, crop protection companies, crop advisors/consultants, extension educators, state and federal regulatory professionals, farm managers, soil and water specialists/conservationists and research technicians.

**Degree Requirements:**

In order to complete the degree, the students must complete 71-74 credits in the major, maintain a minimum GPA of 2.0 in the major courses, meet the SMSU Liberal Arts Core (LAC) requirements. A total of 18 credits are required for a minor in Agronomy. A minimum of 2.0 GPA is required for the minor course.

**Bachelor of Science: Agronomy (71-74 credits)****Pre-Agronomy Requirements (17 LAC credits)\***

ENG 103	Rhetoric: Critical Writing .....	3
MATH 110	College Algebra	
	OR .....	3
MATH 140	Calculus: A Short Course	
CHEM 121	Basic Chemistry .....	4
ENVS 180	Environmental Science .....	4
PHIL 107	Environmental Ethics.....	3

\* Minimum of C in each course before enrolling in AGRO 132 or higher.

**I. Core Requirements (53 credits)**

ENVS 107	Introduction to ArcGIS .....	2
AGRO 115	Professional Dev. in Agriculture: Orientation & Career Planning .....	1
BIOL 200	Cell Biology .....	4
CHEM 122	Introduction to Organic/Biochemistry w/lab .....	4
AGRO 132	Principles and Practices of Crop Production w/lab .....	4
MATH 200	Statistics OR PSYC 200 OR BADM 230 .....	3
AGBU 210	Introduction to Cooperatives .....	3
ENVS 251	Basic Soil Science w/lab.....	4
BIOL 302	Botany w/lab.....	4
AGRO 341	Principles of Pest Management w/lab.....	4
AGBU 350	Agricultural and Environmental Law .....	3
AGRO 454	Experimental Design in Agriculture. ....	3
AGRO 390	Introduction to Precision Agriculture .....	3
AGRO 450	Issues in Sustainable Agriculture.....	2
AGRO 420	Soil Fertility and Fertilizers w/lab.....	3
AGRO 315	Professional Development: Internship .....	4
AGRO 415	Professional Development: Senior Seminar (capstone) .....	2

**II. Agronomy Options (18-21 credits)****A. Crop Management Option (19-20 credits)***Required Courses (14 credits)*

AGRO 212	Grain & Forage Crop Management w/lab .....	3
AGRO 325	Seed Science and Grain Grading w/lab .....	4
AGRO 422	Principles of Weed Science w/lab.....	4
AGRO 440	Plant Breeding .....	3

*Option electives (choose two for 5-6 credits)*

AGRO 332	Crop Quality, Traits and Utilization .....	2
ENVS 221	Introduction to Meteorology.....	3
MKTG 471	International Marketing .....	3

**B. Agroecology Option (18-21 credits)***Required Courses (13 credits)*

BIOL 311	Ecology .....	4
AGRO 312	Agroecology .....	3
ENVS 352	Plant Nutrients in the Environment .....	3

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Note: While every effort is made to ensure accuracy, SMSU reserves the right to correct any clerical errors herein.

ENVS 353	Soil Conservation and Land Use Management .....	3
<i>Option electives (choose two for 5-8 credits)</i>		
AGRO 212	Grain & Forage Crop Management w/lab .....	3
ENVS 221	Introduction to Meteorology .....	3
ENVS 310	Hydrology .....	4
AGRO 332	Crop Quality, Traits and Utilization .....	2
ENVS 401	Wetland Ecology .....	4
AGRO 422	Principles of Weed Science.....	4
C. Soil Resource Management Option (18-21 credits)		
<i>Required Courses (13 credits)</i>		
AGRO 220	Soil Chemistry w/lab .....	3
ENVS 302	Geomorphology .....	3
ENVS 353	Soil Conservation and Land Use Management .....	3
ENVS 426	Soil Morphology and Genesis .....	4
<i>Option electives (choose two for 5-8 credits)</i>		
AGRO 212	Grain & Forage Crop Management w/lab .....	3
AGRO 332	Crop Quality, Traits and Utilization .....	2
ENVS 310	Hydrology .....	4
BIOL 311	Ecology .....	4
ENVS 352	Plant Nutrients in the Environment .....	3
Total Credits:		71-74

**Minor: Agronomy (18 credits)**

<i>Minor core (15 credits)</i>		
AGRO 115	Professional Dev. in Agriculture: Orientation & Career Planning .....	1
AGRO 132	Principles and Practices of Crop Production w/lab .....	4
AGRO 212	Grain & Forage Crop Management w/lab .....	3
ENVS 251	Basic Soil Science w/lab.....	4
AGRO 420	Soil Fertility and Fertilizers w/lab.....	3
<i>Elective (3 credits)</i>		
Choose any AGRO course 300 level or above for 3 credits .....		3
Total Credits:		18

† Students interested in the business aspects of agriculture, please refer to the requirements for Agribusiness minor.

**AGRONOMY COURSES (AGRO)****AGRO 115 Professional Development in Agriculture: Orientation and Career Planning (1 credit)**

The course provides an orientation to the profession of agronomy, agronomy curriculum and college life. Choosing the right majors, resume and cover letter writing, interviewing skills, graduate schools and careers in agronomy profession will be discussed.

**AGRO 132 Principles and Practices of Crop Production (4 credits)**

This is an introductory course in agronomy with a goal to provide the general principles underlying crop production. The course examines the dynamics and functions of crop communities, influence of the environment on crop production, plant morphology and metabolism, crop growth and development, plant breeding as well as soil water management. Other topics that will be discussed are cultural practices associated with optimum crop production and commercial production of selected field crops.

**AGRO 212 Grain and Forage Crop Management (3 credits)**

Production and management of grain and forage crops. Topics to be covered are growth and development, plant characteristics, crop quality, production practices including crop rotation, tillage, soil fertility, cultivar selection, planting strategies, pest management, and harvesting techniques that optimize production and sustains the natural resource base needed to produce high quality and high yielding crops. Principles of grain and forage crop management will also be utilized in solving on-farm problems. Prerequisite: AGRO 132

**AGRO 220 Soil Chemistry and Lab (3 credits)**

Fundamentals of soil chemical properties and processes at the mineral / water interface important for the sound management of soil resources. Topics include sorption/desorption of inorganic and organic compounds, Distributive reactivity models, mobile /immobile sorption domains, bioavailability of nutrients and contaminants, oxidation/reduction, solid-phase equilibria, soil organic matter, soil mineralogy, ion exchange complexation, soil acidity, saline/sodic soils. Prerequisite: Chem 122

**AGRO 312 Agroecology (3 credits)**

Application of ecological principles to the management of food production systems. Emphasis will be on combining principles of crop production with ecological principles to bring a balance between agricultural production and environmental issues.

**AGRO 315 Professional Development in Agriculture: Internship (4 credits)**

An internship with a professionally relevant component. Students are responsible for finding internship opportunities. Prerequisite: Sophomore standing.

**AGRO 325 Seed Science and Grain Grading (4 credits).**

Seed formation and development, germination, maturation, dormancy, vigor, conditioning, and quality evaluation. Seed marketing, organization of the Federal Grain Inspection Agency, development and implementation of regulations governing grain inspection, procedures, techniques and equipment used in grain grading. Prerequisites: AGRO 101 and BIOL 302.

**AGRO 332 Crop Quality, Traits and Utilization (2 credits)**

Pre and Post harvest factors affecting the quality of crops. Characteristics, uses and processing of major food crops. Crop marketing and food safety.

**AGRO 341 Principles of Pest Management (4 credits)**

Effects of insects and diseases on agronomic crops. Identification of important groups of insect pests; causal agents and diagnosis major crop diseases. Analysis of hosts and the environmental factors influencing the increase and spread of crop pests. Emphasis on the use of integrated pest management strategies.

**AGRO 390 Introduction to Precision Agriculture (3 credits)**

The course gives an overview of precision agriculture. Emphasis will be on the different technologies that are currently in use and their applications. Topics include geographical information systems, geographical positioning systems, geo-stationary satellite systems, remote sensing, soil/landscape variability, soil fertility, soil sampling and testing, data collection, processing and management, site-specific farm management, yield monitoring systems, yield maps and economic considerations in site-specific farming.

**AGRO 415 (M) Professional Development in Agriculture: Senior seminar-capstone (2 credits)**

Leadership, decision-making and problem-solving. Students will have the opportunity to interact with professionals in the field of agronomy. Course consists of presentations from speakers working in agricultural fields and paper presentations by students on current issues affecting Minnesota Agriculture.

**AGRO 420 Soil Fertility and Fertilizers (3 credits)**

This course provides students a basic understanding of plant nutrition, soil fertility, and nutrient management. Students describe the influence of soil biological, physical, and chemical properties on nutrient availability to crops. Students further identify soil fertility problems and recommend proper corrective measures that maximize soil productivity and minimize environmental degradation. The laboratory portion of this course introduces students to the chemical methods used in routine soil testing and plant analyses, and to the field soil sampling techniques used for proper nutrient recommendations and management planning. Prerequisite: ENVS 251.

**AGRO 422 Principles of Weed Science (4 credits).**

The course covers the biology, ecology and identification of weeds; weed management by cultural, mechanical, chemical and biological means; integrated weed management; herbicides and factors influencing their use; sprayer calibration and dosage calculations as well as laws and regulations governing herbicide use. Prerequisites: CHEM 122 or higher and BIOL 302

**AGRO 440 Plant Breeding (3 credits)**

An introductory plant breeding course designed to provide the basic principles of cultivar development. Emphasis will be on traditional methods used in developing improved cultivars of field crops and the genetic principles on which breeding methods are based. Additional topics to be covered include biotechnology and germplasm preservation. Prerequisite: AGRO 132 and BIOL 302.

**AGRO 450 Issues in Sustainable Agriculture (2 credits)**

This course examines the concept of sustainable agriculture by looking at the three major themes of sustainability. Students will be introduced to the social, economic and environmental issues affecting agricultural sustainability. The patterns and trends of agricultural production systems will be examined and strategies for implementing sustainable agricultural enterprises discussed. This is a team-taught course and will include lectures, discussions, guest speakers and field trips. Prerequisite: Junior or senior standing.

**AGRO 454 Experimental Design in Agriculture (3 credits)**

The course deals with the design of experiments for agronomic and plant breeding research. Design, analysis and interpretation of both field and greenhouse experiments will be discussed. Prerequisite: MATH 200.