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AGRICULTURE

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Academic Programs	Credits
BS: Agriculture	40
BS: Animal Science	40
Emphasis Areas	
Pre-Veterinary Medicine	
Management	
Equine Science	
BS: Horticulture	40
Emphasis Areas	
Landscape Design	
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BT: Agriculture	60
Emphasis Areas	
Crop Production	
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Emphasis Areas	
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Landscape Design	
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AT: Agriculture	36
Emphasis Areas	
Crop Production	
Dairy Herd Management	
AT: Horticulture	35
Emphasis Areas	
Landscape Design	
Landscape Management	
Minors in Agriculture, Animal Science or Horticulture	20 min.
Pre-Professional Program in Veterinary Medicine	40 min.

Programs

Bachelor of Science. The BS degree prepares individuals to pursue advanced degrees for careers in teaching or research. Students may major in agriculture, animal science, horticulture or landscape design with a minor to complement their intended purpose.

Bachelor of Technology. The BT degree is a career specialist's degree. Graduates are prepared for supervisory and management positions in production agriculture such as crops or dairy herd management, horticulture or the landscape industry.

Associate of Technology. The two-year AT degree programs provide students with adequate skills and working knowledge to apply for entry-level positions in their area of specialization.

Pre-Professional Program in Veterinary Medicine

Katherine Koudele, *Coordinator*
269-471-6299
Smith Hall 112

Entrance requirements vary among veterinary medical colleges. Students should check the websites of their choice for the most current requirements. Accredited veterinary schools are listed on the website of the American Veterinary Medical Association (www.avma.org). Students, in consultation with their departmental advisor, can develop individualized programs to meet the entrance requirements for their preferred veterinary schools.

BS: Agriculture

Major requirements—40

AGRI118, 206, 300, 304, 308, 405; ANSI114; HORT105, plus 15 major elective credits chosen in consultation with advisor.

Cognate requirements—18

BIOL165, 166; CHEM131, 132

BS: Animal Science

Major requirements—40

AGRI405; ANSI114, 305, 425, plus 19–21 credits in a special area of emphasis and 6–10 major electives chosen in consultation with an advisor.

Cognate requirements—18

BIOL165, 166; CHEM131, 132

Animal Science Emphases in BS Program

Students may choose an area of emphasis from the following or develop a personalized program in consultation with their advisor to meet specific career goals.

Pre-Veterinary Medicine—21

AGRI137, ANSI340 (1 species), ANSI379, 420, 435, 440 and 445
Recommended electives for entry into veterinary college:

* BCHM421; CHEM231, 232; MATH166 & 167 or 168; PHYS141, 142.

* Courses may vary depending on entrance requirements of the veterinary college of choice.

Management—19

AGRI137 (2), 395; ANSI340 (2 species); ACCT121; AGRI270. Major electives can be tailored to meet a specific student's interest.

Equine Science—21

ANSI340 (Equine Management), 440, 445, 450, 455, 460; AGRI137 (1–2), 395 (1–2)

BS: Horticulture

Major requirements—40

AGRI118, 240, 308, 405; HORT105, 378, plus 18 credits in a special area of emphasis and 2 credits major elective.

Cognate requirements—18

Select credits from BIOL165, 166; BIOL208, 475; ZOOL459; CHEM131, 132; FDNT230/240.

Horticulture Emphases in BS Program

Students may choose an area of emphasis from the following or

develop a personalized program in consultation with their advisor to meet specific career goals.

Landscape Design—18

Select from the following: HORT136, 137, 226, 228, 315, 350, 365, 375, 429, 448

Landscape Management—18

Select from the following: HORT136, 137, 208, 211, 226, 228, 315, 350, 360, AGRI308, 240

General Education Requirements for BT Agriculture, Horticulture & International Agriculture Development Degrees

See professional program requirements, p. 51, and note the following **specific** requirements:

Religion: professional degree requirements

Language/Communication: professional degree requirements

History: professional degree requirements

Fine Arts/Humanities: professional degree requirements

Life/Physical Sciences: professional degree requirements

Social Sciences: ECON225 required for BT International Agriculture Development. Other BT degrees follow professional degree requirements.

Mathematics: professional degree requirements

Computer Literacy: INFS120 or pass competency test

Fitness Education: professional degree requirements

Service: BHSC100. 40 hours of service or alternative field service for majors in: HORT365, ANSI425. Service requirement covered in core curriculum for BT International Agriculture Development majors.

Fitness Education: professional degree requirements

BT: Agriculture

Major requirements—60

AGRI118, 137, 270, 395, 405, plus one of the areas of emphasis below

Emphasis in BT Degree Program

Student may choose an area of emphasis from the following or develop a personalized program in consultation with their advisor to meet specific career goals.

Crop Production—46

AGRI206, 240, 300, 304, 308, 378, HORT105, 378 plus 18 major elective credits chosen with advisor

Cognate requirement—4

CHEM100 or 110

Animal Husbandry—46

ANSI114, 125, 205 or 305, 245, 325, 340, 425 plus major elective credits chosen with advisor to specialize in dairy herd management, equine management or another area.

Cognate requirement—4

CHEM100 or 110

Agribusiness—46

Major elective credits selected with advisor from AGRI, ANSI or HORT courses—24

Cognate requirement—22

ACCT121, 122, BSAD341, 355, CHEM100 or 110, ECON226, FNCE317

BT: International Agriculture Development

The Bachelor of Technology in International Agriculture Development is designed to provide students with knowledge, skills and experience to prepare them for entry-level positions in agriculture or international development or to pursue an advanced degree. Students who complete this degree will be eligible to enter the MS Community & International Development program at Andrews University with Advanced Standing.

Major requirements—59

ANSI114; AGRI118, 240, 270, 390, 395, 498; HORT105, 208; select 12 credits from ANSI305, 340, 440; AGRI300, 308; HORT150, 310; select 9 credits from AGRI345, 467, 468, 498.

Cognate requirement—25

ACCT121; BHSC230, 432; ECON225; SOCI421, 431, 350, 360, 408

BT: Horticulture

Major requirements—60

AGRI118, 240, 308, 395, 405, HORT105, 150, 208, 378, plus 4–10 major elective credits chosen in consultation with advisor.

Cognate requirement—4

CHEM100 or 110

Horticulture Emphases in BT Program

Students may choose an area of emphasis from the following or develop a personalized program in consultation with their advisor to meet specific career goals.

Landscape Design—30

HORT136, 137, 226, 228, 315, 350, 365, 375, 429, 448. The landscape design program emphasizes the development of technical drawing skills, CAD application, an understanding of the principles of design and knowledge of plants.

Landscape Management—14

HORT208, 211, plus 9 credits from the following: AGRI308, HORT350, 360, 375, 378. The landscape management emphasis features proper horticultural practice, identification of landscape plants, selection of appropriate equipment, and the concept of total maintenance.

Horticultural Crop Production—24

Credits will be chosen in consultation with advisor from the following: AGRI206, 208, 240, 300, 308, 345, HORT208, 226, 228, 360, 369, 378. The horticultural crop production emphasis prepares students for careers in the greenhouse/nursery industry or vegetable/fruit production industry.

AT: Agriculture

Major Requirements—25–36

ANSI114, 205 or 305, 340, plus 15–24 credits in a special area of emphasis (see below) and 2–4 major elective credits chosen in consultation with advisor.

Cognate requirement—4

CHEM100 or 110

Agriculture Emphases in AT Program

Students may choose an area of emphasis from the following or develop a personalized program in consultation with their advisor to meet specific career goals.

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Crop Production—24

AGRI118, 206, 240, 300, 395; HORT105

Dairy Herd Management—22

AGRI270, 304, 395; ANSI240, 250, 278

AT: Horticulture

Major requirements—35

AGRI118, 395(3) 405; HORT105, plus 11–13 credits in a special area of emphasis (see below) and 9–11 major elective credits chosen in consultation with advisor.

Cognate requirement—4

CHEM100 or 110

Horticulture Emphases in AT Program

Students may choose an area of emphasis from the following or develop a personalized program in consultation with their advisor to meet specific career goals.

Landscape Design—13

HORT136, 226, 228, 350

Landscape Management—11

HORT208, 211, 226, 228

Minors in Agriculture, Animal Science or Horticulture—20

Selected from AGRI, ANSI or HORT courses in consultation with advisor.

Courses

See inside front cover for symbol code.

(Credits)

Agriculture

AGRI118

Soil Science

Factors affecting soil formation, soil texture, particle size, pore space and their impact on soil air/water relations, and chemical characteristics of soils, including pH, ion exchange, and maintenance of soil fertility. Weekly: 3 lectures and a 3-hour lab.

\$ Alt (4)

AGRI137

Practicum in _____

Fifty hours per credit of supervised practical experience in one area of concentration. May be repeated in different areas for a maximum of 6 credits. Topics to be chosen in consultation with an advisor. *Fall, Spring*

(1–3)

AGRI206

Farm Machinery

Selection and operation of farm equipment, based on the initial cost and economic performance, including factors governing the site and type of farm machines, their capacity, efficient use, adjustment and repair. Weekly: 2 lectures and a 3-hour lab.

\$ Alt (3)

AGRI240

Fundamentals of Irrigation

Design, installation, drawing, interpretation and maintenance of

Alt (3)

plastic or metal irrigation systems and control devices for proper sprinkler coverage. *Fall*

AGRI270

Management of Agriculture Enterprises

An introduction to acquiring and analysis of management information for decision making; an understanding of basic economic principles that impact biological production systems and implementation of the principles for total quality management for increased productivity.

Alt (3)

AGRI300

Field Crop Production

Importance, distribution, economic adaptation, and botany of leading farm crops, emphasizing rotation, seedbed preparation, and economic production.

Alt (3)

AGRI304

Forage Crop Production

Basic principles of forage crop production, emphasizing choice of crop, establishment, growth, maintenance, harvesting, storage and feeding.

Alt (3)

AGRI308

Principles of Weed Control

Control of weeds in horticultural and field crops, utilizing biological, cultural, mechanical, and chemical practices. Class study also involves preparation and testing for pesticide applicator's license. Weekly: 2 lectures and a 3-hour lab.

\$ Alt (3)

AGRI345

Topics in _____

A class based on selected topics of current interest in agriculture. Repeatable in different areas including, but not limited to:

- Concepts of International Agriculture
- Tropical Crop Production
- Value-Added Products
- Post-Harvest Storage Systems
- Mittleider Method
- Viticulture
- Solanaceous and Vine Crop
- Tree Fruit Production
- Equine Dentistry
- Equine Hoof Care and Basic Shoeing
- Hippotherapy/Therapeutic Riding
- Riding Instruction—English
- Riding Instruction—Western
- Equine Massage Therapy
- Horse Judging
- Livestock Judging
- Ruminant Nutrition

(1-4)

AGRI390

Agriculture Study Tour

Agriculture study tours are designed to enhance and broaden the on-campus learning experience by visiting areas of horticultural and agricultural interest and their impact on the local culture and society. Students will be expected to conduct pre-tour research on a specific topic related to the purpose of the tour and a post-tour analysis and synopsis of the tour experience.

\$ (1-4)

AGRI395

Internship in _____

Supervised internship of on-the-job work experience in some field of agriculture under the direction of the employer and evaluated

(1-6)

by a departmental faculty member. Students submit a report of their experience and must complete a minimum of 120 hours of work experience for each credit earned. Repeatable up to 6 credits.

AGRI405 (1)

Research Seminar

Research results or internship reports in agriculture and related fields; presentations given by students, faculty and visiting lecturers. *Spring*

AGRI467 Alt (3)

Concepts of International Agriculture

A study of the relative significance of the role of external institutions and agency, financial programs for agricultural development, human resource development and agricultural education as a means of fostering worldwide agricultural development to counter-balance the threat to global food security and to overcome food deficits.

AGRI468 Alt (3)

International Agricultural Implementation

The application of scientific agricultural principles of food production, utilizing cultural practices based on appropriate agricultural technologies that support a philosophy of sustainability for future generations.

AGRI498 (1-6)

International Internship in _____

Supervised internship of on the job international work experience in agriculture/horticulture. Students submit a report of their experience to be evaluated by a departmental faculty member and must complete 120 hours of work experience for each credit earned. Repeatable up to 6 credits.

AGRI499 (1-5)

Project in _____

Individual research in some field of agriculture under the direction of the faculty. Repeatable to 10 credits. Prerequisite: AGRI405 or permission of the instructor.

Animal Science

ANSI114 (3)

Introduction to Animal Science

Basic farm animal anatomy, reproductive and digestive physiology, nutrition, genetics, housing, health management with information on how animal products are harvested, processed and marketed. *Fall*

ANSI125 \$ Alt (3)

Livestock Handling Methods

Principles and practices of handling livestock including proper catching, restraint, injections, tagging, grooming and hoof trimming. Weekly: 2 lectures and a 3-hour lab. *Fall*

ANSI150 \$ Alt (3)

Companion Animal Care

Principles and practices on how to choose the right pet for your life situation, how to travel with your pet on all kinds of transportation, how to keep your pet healthy, grooming, training and correcting behavioral problems. Animal species covered are dogs, cats, small caged pets/rodents, birds, fish, reptiles and amphibians. Weekly: 2 lectures and a 3-hour lab. *Fall*

ANSI205 \$ Alt (3)

Animal Feeds and Feeding

Classification and function of nutrients, deficiency symptoms, digestive processes, characterization of feedstuffs, and formulation of diets for domestic animals. Weekly: 2 lectures and a 3-hour lab. Recommended CHEM100. *Fall*

ANSI245 \$ Alt (3)

Animal Breeding and Genetics

Basic anatomy and physiology of the reproductive systems of domestic animals, basic principles of genetics in order to make sound genetics and breeding decisions, including the manipulation of reproductive cycle, artificial insemination. Weekly: 2 lectures and a 3-hour lab. *Spring*

ANSI250 \$ Alt (3)

Dairy Facilities

A study of various types of milking systems, housing and manure handling systems of dairy cattle of all ages and production levels. Ventilation, stall and barn dimensions, and bedding will be some of the topics covered. Weekly: 2 lectures and one 3-hour lab.

ANSI278 \$ Alt (3)

Dairy Health and Disease

Principles and practice of physical examination of dairy cattle and the causes, preventions and treatment of infectious and metabolic diseases by system. Also included are dairy cattle breeding and genetics. Weekly: One 2-hour lecture and one 3-hour lab. *Spring*

ANSI305 Alt (3)

Animal Nutrition

Principles of feed chemistry and nutrient utilization, digestive tract anatomy and physiology including digestion, absorption, metabolism of feeds by farm species, nutrition related diseases/deficiencies and ration formulation. Weekly: 3 lectures. Recommended: CHEM 131 or higher. *Fall*

ANSI325 \$ Alt (3)

Domestic Animal Behavior

Physiological basis for each type of behavior and its development, communication methods, normal and aberrant behavior in each domestic animal species as well as treatments for problem situations. Weekly: 2 lectures and 1 lab. *Fall*

ANSI340 \$ (3)

Production/Management of _____

Production methods and management practices of domesticated livestock species including nutrition, reproduction, housing, health and specialized care of a particular species. Course is repeatable for study of dairy cattle, equine, poultry and small livestock. Weekly: 2 lectures and 1 lab. *Fall, Spring*

ANSI379 Alt (3)

Small Animal Health and Disease

Proper handling and care, nutritional needs, and common health problems of companion animals such as dogs, cats, birds, pocket pets, reptiles. *Fall*

ANSI420 \$ Alt (4)

Canine Gross Anatomy

Study of macroscopic skeleton, muscles, internal organs, blood vessels and nerves using preserved, latex-injected specimens. Comparisons made with the live dog through palpation. Weekly: 2 lectures and 2 three-hour labs. Recommended: BIOL166. *Fall*

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- ANSI425** **S Alt (3)**
Issues in Animal Agriculture, Research and Medicine
Study of the ethical issues that challenge animal researchers, producers, caretakers, and veterinarians to treat animals humanely yet effectively in society today. *Spring*
- ANSI430** **\$ Alt (3)**
Lactation Physiology
Anatomy and physiology of the udder, milk secretion, disease prevention and treatment, milking management and milking systems. Weekly: 2 lectures and 1 lab. Recommended: BIOL166. *Spring*
- ANSI435** **Alt (3)**
Animal Genetics
Basic genetics principles, cytogenetics, immunogenetics, population genetics and quantitative genetics, biotechnology, gene mapping and the use of molecular tools to research inherited disorders using examples of veterinary medicine. Recommended: BIOL166. *Spring*
- ANSI440** **\$ Alt (3)**
Animal Reproduction
Anatomy and physiology of farm animal reproduction including the cellular and endocrine components as well as management aspects. Recommended: BIOL166. *Spring*
- ANSI445** **\$ Alt (3)**
Physiology of Farm Animals
Physiology of digestive, cardiovascular, pulmonary, excretory, nervous, and skeletomuscular systems in domesticated ruminants and monogastrics. Weekly: 2 lectures and a 3-hour lab. Recommended: BIOL166. *Fall*
- ANSI450** **Alt (3)**
Equine Exercise Anatomy & Physiology
The anatomy and physiology of the limbs (shoulder and pelvic girdles, legs, feet) as well as the respiratory tract, all of which are vital to a horse's usefulness. *Spring*
- ANSI455** **Alt (3)**
Equine Health and Disease
Topics covered in depth are: the causes of infectious (e.g. tetanus, strangles) and non-infectious (e.g. laminitis, colic, injury), diseases of horses, their prevention, diagnosis and treatment. *Fall*
- Horticulture**
- HORT105** **\$ (5)**
Plant Science
Introduces students to the requirements of plant growth and development. Understanding of these processes is gained by studying topics such as plant cells, tissue, and organ structure; photosynthesis, cellular respiration, plant reproduction, including flowering, fruit development, seed set, the role of hormones, and plant nutrition. Weekly: 4 lectures and a 3-hour lab. *Fall*
- HORT136** **\$ (4)**
Landscape Drafting and Graphics
Introduces and develops proficiency in technical drafting for landscape design including symbols, 2-D and 3-D drawings, sections and elevations, title blocks, legends and plan organization. Laboratory puts graphics to work with a broad range of landscape projects represented. Weekly: 3 lectures and 4 hours of lab. *Fall*
- HORT137** **\$ (4)**
Fundamentals of Landscape Design
Introduces and develops the principles of design, design theory, site analysis, functional diagramming, circulation, spatial planes and design schematics. Course will explore both hardscape and softscape principles. Laboratory puts the design process to work drawing plans of all sizes. Weekly: 3 lectures and 4 hours of lab. *Spring*
- HORT150** **(3)**
Home Horticulture
An introduction to the horticultural and landscape field for majors and homeowners alike, this class offers basic care of the home landscape. Landscaping with ornamental trees and shrubs, perennials and annuals or growing fruits and vegetables for the garden are included. Become skilled at pruning and training plants, diagnosing and treating insect and disease problems, fertilizing techniques, and more. Course prepares you for home ownership and teaches life skills for creating a productive and beautiful home environment.
- HORT208** **\$ Alt (3)**
Propagation of Horticultural Plants
Intended to acquaint students with the processes of asexual reproduction, especially as it applies to the horticultural industry. Asexual reproduction investigates methods of clonal reproduction utilizing non-flowering plant parts such as cutting, grafting, layering, and micro propagation (tissue culture). Weekly: 2 lectures and a 3-hour lab. Recommended: HORT105. *Spring*
- HORT211** **\$ Alt (2)**
Landscape Equipment
Assessment of and exposure to current equipment needed to run a landscape installation and maintenance business. Experience in physical operation of equipment, preventative maintenance and minor repair is practiced. Weekly: 1-hour lecture and a 3-hour lab. *Fall*
- HORT226** **Alt (3)**
Woody Plant Identification
Introduction to the identification and recognition of shape, size, color, texture, environmental requirements and landscape value of common deciduous and evergreen trees, shrubs and vines. *Fall*
- HORT228** **Alt (3)**
Herbaceous Plant Identification
Identification and recognition of shape, size, color, texture, and environmental requirements of the nonwoody plants providing color and ground cover in the landscape. *Fall*
- HORT310** **(3)**
Commercial Vegetable Production
Production and management of commercial vegetable crops; includes planting, cultural care, harvesting and post-harvesting procedures and marketing.
- HORT315** **\$ Alt (3)**
Landscape Structures and Materials
Course combines lecture, drawing and hands-on labs covering an array of hardscape materials including retaining walls, decks and arbors, patios, fencing, edging, pools and more. Weekly: 2 lectures and 3 hours of lab. *Spring*

HORT340 \$ (2)***Land Surveying***

Course introduces the principles of land surveying such as measurements of distance, elevation and angles, instrumentation and mapping, and GIS. Weekly: 1 lecture and 2 hours of lab. *Fall*

HORT350 AH (3)***History of Landscape Architecture***

A study of landscape history throughout civilization and its impact upon society and the environment. Course will look at the origin of landscape architectural styles and characteristics, and explore the influence of historical landscape design personalities upon the American landscape. *Spring*

HORT360 \$ Alt (3)***Arboriculture***

Care of shade and ornamental trees living under environmental stress of urbanization, their legal protection and value. Includes tree anatomy and physiology, soils, nutrition and water relationships, transplanting, disease and insect control, mechanical injury and pruning to develop a healthy tree. Weekly: 2 lectures and a 3-hour lab. *Fall*

HORT365 S \$ Alt (3)***Urban Landscape Design***

Designing landscapes to meet the environmental challenges and conditions of urban spaces. Circulation patterns for conducting business, aesthetic and functional aspects of design for corporate/institutional, governmental agencies and municipal areas. Weekly: 2 lectures and a 3-hour lab. Recommended: HORT135. *Spring*

HORT369 \$ Alt (3)***Greenhouse Environment and Production***

Concepts and principles of commercial plant production in the greenhouse environment. Topics include structure and environment of the greenhouse, production of bedding and potting plants and cut flowers. Weekly: 2 lectures and a 3-hour lab.

HORT375 Alt (3)***Landscape Estimating***

An introduction to the estimating process for landscape design, construction and maintenance work. Various schedules and forms are used to assign costs of equipment, plants, hardscape materials, labor and overhead. The many variables from project to project are explored and then formulas are applied to arrive at making landscape installations an efficient and profitable business. *Spring*

HORT378 Alt (4)***Integrated Pest/Disease Management***

Study of significant diseases and pests of agricultural and horticultural plant materials, including life cycles and influence of environmental conditions; determination of effective control methods for crop, ornamental and turfgrass production. *Spring*

HORT429 \$ Alt (3)***Computer Landscape Design***

Principles and practices of computer-aided landscape design, including creating scale perimeter plot plans, using drawing tools, plant/site relationships, and graphic imaging leading to a computer-generated landscape drawing. Laboratory emphasizes skill development and proficiency in integrating software and

hardware to create CAD-generated landscape designs. Prior landscape drawing course work is recommended. *Spring*

HORT448 \$ Alt (4)***Advanced Landscape Design and Graphics***

Landscape design concepts relating to the more challenging problems of residential design. Field application of grading relating to contours, specifications, exploring deck design, planting combinations, and exercises in graphics and rendering for presentations. Weekly: 3 lectures and a 3-hour lab. Recommended: HORT135. *Spring*