

Academic Offerings

This section contains descriptions of programs, majors, minors, areas of concentration, fields of specialization, and courses. Semesters following course titles indicate when each course is normally offered. On rare occasions, a course may not be available when indicated because of low enrollment or unexpected staffing changes.

Courses listed as Fall Odd and Spring Even are scheduled to be offered during the 2011-2012 academic year. i.e., fall 2011-2012 is Fall Odd, spring 2011-2012 is Spring Even.

Agriculture

The objectives of the course requirements in agriculture, and the other majors as well, are to enable students to develop a basic understanding of the discipline, to learn skills that will equip them to serve in God's kingdom in this area, and to prepare them for future learning experiences.

General Major- Foundation (common to all emphases): Agriculture 101, 105, 111, 290, 361, 370, 380, 381.

Students must select one of the following emphases:

Agri-business: Foundation; Chemistry 101; Agriculture 221, 312, 321; one course from Agriculture 201, 232, 233, 234, 235, 238, 251, 255; Business Administration 201, 202, 205, 206; Economics 202, 203; business administration or economics elective 200 level or above. Agriculture 371 is also recommended.

Animal Science: Foundation; Chemistry 101 or 103, 104 or 122; Biology 122, 213, *302; Agriculture 221, 232, 234, 291; one course from Agriculture 233, 235, 238; two courses from Agriculture 331, 332, 334, 336. Agriculture 321 and 371 are also recommended. *Pre-vet students and those considering graduate school should take Biology 310 rather than Biology 302.

Biotechnology: Foundation; Chemistry 101, 122 or 103, 104; Chemistry 221, 222, 325, 326; Biology 213, 214, 310, 322, 335; Biotechnology 213; three credits from Agriculture 201, 232, 234, 291, 315, 316, 332, 334, Biology 319, 323. Students in the biotechnology emphasis must take Biotechnology 361 instead of Agriculture 361 and may substitute Biotechnology 373 for Agriculture 380 and 381 in the foundation requirements.

General: Foundation; Chemistry 101, 122 or 103, 104; Agriculture 201, 221, 232; six credits from Agriculture 233, 234, 235, 238, 291, 331, 332, 334, 336, Biology 213, 302; six credits from Agriculture 251, 255, 311, 315, 316, 350, Biology 115, 319. Agriculture 321 and 371 are also recommended.

Missions: Foundation; Chemistry 101 or 103; Agriculture 221; nine credits from Agriculture 201, 232, 233, 234, 235, 238, 251, 255, 311, 350, BY 291 Sustainable Tropical Agriculture (Gordon College); Theology 231, 331, 332; Theology 322 or 323; one course from Theology 211-217; CORE 270 or participation in an off-campus program or one course from CORE 281-286.

Plant Science: Foundation; Chemistry 101 or 103, 104 or 122; Biology 115, 213, 319; Agriculture 201, 221, 311; Agriculture 251 or 255; Agriculture 315 or 316; one course from Agriculture 341-350. Agriculture 321 and 371 are also recommended.

General Minor– Agriculture 101, 105, 111, 221, 290; Chemistry 101; Economics 200 or 202.

Associate of Arts Degree Options Area of Concentration (Associate of Arts in Agriculture)

See the “Academic Program” section for the core program for all A.A. programs (pages 31-33).

Agriculture 101, 105, 111, 221, 290; Agriculture 201 or 232; three elective credits of agriculture; Chemistry 101; Economics 200 or 202; CORE 200 (fulfills core program distribution elective).

For details on the Bachelor of Science SECONDARY Agriculture Education degree, available through articulation agreement with the University of Nebraska-Lincoln, see Dr. Duane Bajema in the agriculture department.

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- 101 **Biology, Care, and Production of Domestic Animals (4)**Spring
History, management, physiology, breeding, lactation, feeding, health, and products of cattle, swine, sheep, poultry, companion animals, and other species as they relate to humans and the creation. Three lectures and one three-hour laboratory period per week.
- 105 **Orientation and Agricultural Safety (1.5)** Fall, Spring
Classroom discussion and practical experience are used to familiarize students with the Agriculture Stewardship Center (ASC) and greenhouse and to develop understanding and competency in the areas of current agricultural production practices and safety procedures. Students will be certified in CPR and complete first aid training. The course meets for six weeks. Two lectures, a three-hour laboratory, and three hours of scheduled activity at the ASC per week.
- 106 **Agricultural Operation and Experience (1.5)**..... Fall, Spring
Designed to give students the opportunity to develop additional skills and proficiencies in agricultural operations. Prior permission from the instructor(s) is required for enrollment. Prerequisite: Agriculture 105.
- 111 **Introduction to Plant Science (4)** Fall
Students will study plants, their care and use within agroecosystems, as well as their role in creation. Students will be introduced to how agriculture both influences and is influenced by human cultural development, how humankind’s understanding of stewardship influences creation care, and how plants serve as sources of food, fiber, fuel, and fascination. Plant biology concepts including plant structure and function, growth, development and reproduction, and plant/environment interactions will be introduced. The course will demonstrate how these biotic and environmental factors integrate with plant biotechnology, crop breeding and propagation, protection, cropping systems, and crop economics and utilization. Three lectures and one three-hour laboratory per week.
- 201 **Nature and Properties of Soils (3)**Spring
A comprehensive introduction to the field of soil science with an emphasis on scientific principles and their application in solutions to practical soil management problems. Two lectures and one three-hour laboratory per week. Prerequisites: Agriculture 111 or Biology 115; Chemistry 101 or 103.
- 221 **Introduction to Farm Management and Accounting (3)**Spring
The study of decision-making in the operation of an agricultural business using financial information and other

criteria. Topics include current agricultural policy, goal setting, planning, organization of the farm business, systems management, record keeping, budgeting, balance sheets, income statements, cash flow statements, investment analysis, tax planning, and risk analysis. Two lectures and one three-hour laboratory per week. Prerequisite: Economics 200 or 202.

- 232 **Feeds and Feeding (3)** Fall
 The evaluation, composition, and values of feedstuffs as they relate to animal nutrient requirements will be considered. The basics of ration formulation and feeding management will be covered for the major livestock species. Two lectures and one three-hour laboratory per week. Prerequisites: Agriculture 101; Chemistry 101 or 103.
- 233 **Principles of Dairy Science (3)**.....Spring Even
 Dairy reproduction, physiology, lactation, breeding, nutrition, and genetics will be discussed with an emphasis on scientific principles and their application to dairy science. Two lectures and one three-hour laboratory period per week. Prerequisites: Agriculture 101; Chemistry 101 or 103. Agriculture 232 recommended.
- 234 **Principles of Animal Health (3)**Spring Odd
 Animal care and facility sanitation will be discussed, focusing on care, disease prevention, disease detection, animal treatment, pharmacology, and health programs. Three lectures per week. Prerequisites: Agriculture 101, 232; Chemistry 101. Biology 302 or 310 recommended.
- 235 **Principles of Swine Science (3)** Fall Even
 A study of swine care and management, physiology, diseases, equipment, reproduction, and nutrition. Two lectures and one three-hour laboratory per week. Prerequisites: Agriculture 101; Chemistry 101 or 103. Agriculture 232 recommended.
- 238 **Beef and Sheep Science (3)**Fall Odd
 A study of beef and sheep management, production, physiology, nutrition, reproduction, diseases, equipment, facilities, and care. Two lectures and one three-hour laboratory per week. Prerequisites: Agriculture 101; Chemistry 101 or 103. Agriculture 232 recommended.
- 251 **Horticultural Plants (3)**Spring
 The study of greenhouse, vegetable, and ornamental plants. The aesthetics, culture, physiology, and propagation of horticultural plants will be examined. Two lectures and one three-hour laboratory per week. Prerequisite: Agriculture 111 or Biology 115.
- 255 **Forage Crop Management (3)** Fall Even
 The production and management of crops for livestock feed are considered, and the establishment, growth, harvesting, preservation, and quality of these crops are examined. Primary emphasis is given to the value of major temperate region grasses and legumes as livestock feed, and the energy, protein, and other nutritional components they supply. The identification of common and alternative forage species is an important component of the course. Two lectures and one three-hour laboratory per week. Prerequisites: Agriculture 101, 111.
- 281- **Service-Learning (1-3)**Fall, Spring, Summer
 283 See page 161, Individual Studies
- 290 **Perspectives on Agricultural Economics, History, and Policy (3)**.....Spring
 The historical changes in food production, management, and processing systems are examined, and the impacts of past philosophies, religions, and worldviews on contemporary agricultural systems are discussed. Domestic and international agricultural policy is also studied. Several views on these topics are examined, and a Reformed perspective is developed. Two lectures and a one-hour small group discussion period per week. Prerequisites: CORE 140; sophomore standing. Economics 200 or 202 or Political Studies 201 recommended.

- 291 **Anatomy and Physiology of Animals (4)** Fall Even
 The structures and functions of the major body systems will be studied as they work together in the life processes of an animal. The nervous, skeletal, muscle, circulatory, endocrine, digestive, and reproductive systems will be examined. Three lectures and one three-hour laboratory per week. Prerequisites: Agriculture 101 or Biology 122; Chemistry 104 or 122.
- 303 **Geographic Information Systems (3)** Fall Even
 An introduction to the acquisition, analysis, display, manipulation, and management of geographic information. An overview of survey methods used to gather and quantify features of physical geography will be practiced. Course topics will include geographical data input, storage, maintenance, analysis, and retrieval. Students will utilize common GIS software and associated hardware. The course will meet in two studio lab classes to provide an integral learn-by-doing experience applying surveying methods, GPS technology, and GIS applications. Application of GIS to agriculture, business, environmental management, and other disciplines will be provided in this course. Prerequisite: sophomore standing or above. [Cross-listed: Business Administration 303, Construction Management 207, Environmental Studies 303]
- 311 **Soil Fertility (3)** Spring Even
 An integrated discussion of soil-crop yields relationships with emphasis on the soil as a source of mineral nutrients for crops and the role of fertilizers and manure in crop production. Three lectures per week. Prerequisites: Agriculture 111, 201; Chemistry 101 or 103.
- 312 **Marketing of Agricultural Products (3)** Fall
 An analysis of agricultural marketing systems, factors determining agricultural prices, and farmer marketing management. Topics include setting marketing goals, government price institutions, contract and futures markets, and marketing under risk and uncertainty. Three lectures per week. Prerequisite: Agriculture 221 or Business Administration 205, 206.
- 315 **Entomology and Pest Management (3)** Fall Odd
 An introduction to entomology and insect-pest management including insect biology, taxonomy, ecology, life cycles, and integrated pest management. Three lectures per week. Prerequisites: Agriculture 111 or Biology 115; Chemistry 101 or 103; junior standing.
- 316 **Plant Protection - Weed Science and Plant Pathology (3)** Spring Odd
 A study of the major weed and plant pathology principles and theories and their application to the field of pest management. The course will include identification, physiology, ecology, life cycles, and stewardly management practices for important pest species. Prerequisites: Agriculture 111 or Biology 115; Chemistry 101 or 103; junior standing.
- 321 **Advanced Farm Management (3)** Fall
 Christian concepts of stewardship and justice in agriculture, advanced planning techniques, investment analysis, agricultural finance, decision-making under risk and uncertainty, intergenerational transfer of the family business, governmental regulation and promotion of agriculture. Three lectures per week. Prerequisites: Agriculture 221 or Business Administration 100; Business Administration 201, 205; Economics 200 or 202.
- 331 **Reproductive Physiology (1.5)** Spring Even
 A study of the principles of reproductive physiology and lactation focusing on the major classes of livestock. Students will use these principles to develop an understanding of reproductive management techniques and will examine the ethics of reproductive technologies. Two lectures and one three-hour laboratory per week for seven weeks. Prerequisites: Agriculture 291; Chemistry 101 or 103.
- 332 **Advanced Animal Nutrition (1.5)** Spring Odd
 A problem-solving approach will be taken to examine the nutrient requirements of animals in different production systems. The methods that can be used to meet those requirements will be evaluated. Ration formulation will be discussed as it relates to the different digestive systems and production requirements. Two lectures and one three-hour laboratory per week for seven weeks. Prerequisites: Agriculture 232; Chemistry 122.

- 334 **Applied Animal Breeding (1.5)**Spring Even
Quantitative genetic principles will be applied to livestock production systems. Improvement programs utilizing selection practices and mating systems will be discussed. Two lectures and one three-hour laboratory per week for seven weeks. Prerequisites: Agriculture 101; Chemistry 101 or 103. Biology 213 recommended.
- 336 **Meat Science (1.5)**Spring Odd
The processes of converting muscle tissue into meat and factors affecting meat quality will be studied. The role of the producer, packer, USDA, and consumer in quality and safety issues will be examined. Two lectures and one three-hour laboratory per week for seven weeks. Prerequisites: Agriculture 101; Chemistry 101 or 103.
- 337 **ECHO Agricultural Conference (1)**Spring
Participation in the major agricultural development conference held in December in Fort Myers, Florida. The Educational Concerns Hunger Organization hosts this international conference, which focuses on agricultural development, cross-cultural issues, and community development. Prerequisite: sophomore standing. [Cross-listed: Theology 337]
- 341- **Special Topics (3)**Occasional
348 Courses vary from year to year and are designed to meet special student interests and utilize staff strengths and talents of experts in the community. Each course covers material not usually treated in regularly scheduled courses.
- 350 **Field Crop Production and Management (3)**..... Fall
Grain and forage production in the North Central Region of the U.S. is investigated using lectures, group projects, field trips, and production and research experiences at the ASC. The role of grains in world food production is examined, and students are challenged to find solutions to the problems frequently associated with grain production. Students collect and analyze field crop data and explore sustainable crop production methods and systems. The investigation of new and innovative crop production strategies is an important component of the course. Two lectures and one three-hour laboratory per week. Prerequisites: Agriculture 105, 111, 221; one course from Agriculture 201, 251, 255, 311, 315, 316.
- 361 **Agriculture Senior Seminar (3)**Spring
An integration of departmental courses, research, and analysis of current topics with emphasis on Christian perspective for persons involved in agriculture. Issues will include government policies, world hunger, the family farm, meat production, and others. Three lectures per week. Prerequisites: CORE 200; junior or senior standing in the agriculture department; or by permission of instructor. [Cross-listed: CORE 311]
- 370 **Agroecology (4)** Fall
An introduction to the principles of agricultural ecology with an emphasis on Christian stewardship of God's world. Topics include the development and characteristics of agroecosystems, ecological disturbance and succession, diversity, pest management, nutrient cycling, environmental quality, energy use, climate change, social capital, conservation practices, and global food production. The interaction of agroecosystems with surrounding ecosystems is studied, and the utilization of ecological principles in agroecosystem design and management are examined. Three lectures and one three-hour laboratory per week. Prerequisites: Agriculture 101 and 111 or Biology 115 and 122; Chemistry 101; junior or senior standing.
- 371 **Practicum (3)**..... Spring
Students are given the opportunity to apply the principles of agriculture and business in an off-campus assignment. Ten hours per week at an off-campus site. Prerequisite: senior standing in the agriculture department.
- 380 **Directed Study - Class Component (1.5)**..... Fall
Students, in groups of two or three, design a study of particular interest to them with the guidance of a faculty member in the agriculture department. The course involves identifying a relevant problem or question, reviewing background information, preparing a study proposal, and obtaining the agriculture department's approval of the

proposal. Class meets one period per week (Tuesday or Thursday). Prerequisites: Agriculture 101, 105, 111; Agriculture 290 or 370; junior or senior standing.

- 381 **Directed Study - Project Component (2.5)**.....Fall, Spring, Summer
A continuation of Agriculture 380. Students, working in groups of two or three, will collect and analyze data, evaluate the findings from a Christian perspective, and present their results in written and oral form. Research will typically be conducted during the spring or summer semester with a presentation the following fall (for seniors the presentation will be at the end of spring semester). Prerequisite: Agriculture 380.

- 391- **Individual Studies (1-3)**Fall, Spring, Summer
- 393 See page 161, Individual Studies