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 2015-16 academic year. i.e., fall 2015-16 is Fall Odd, spring 2015-16 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 or 111; 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 373 recommended.

Animal Science:

Foundation; Chemistry 101, 122 or *Chemistry 111, 225; Biology 125, *302, 324; Agriculture 221, 232, 234, 291; one course from Agriculture 233, 235, 238; two courses from Agriculture 331, 332, 334, 336. Agriculture 321 and 373 recommended. *Those considering graduate school should take Biology 310 instead of Biology 302 and Chemistry 111, 225 instead of Chemistry 101, 122. Pre-vet students should take Biology 310 instead of Biology 302 and Chemistry 111, 212, 225.

Biotechnology:

Foundation; Chemistry 111, 225, 261, 321 or 322, 323, 361; Biology 125, 310, 324, 335; three credits from Agriculture 201, 232, 234, 291, 315, 316, 332, 334, Biology 319. Students in the biotechnology emphasis must have a biotechnology component in Agriculture 361 and may substitute Agriculture 373 for Agriculture 380 and 381 in the foundation requirements.

General:


Missions:

Foundation; Chemistry 101 or 111; 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 one course from CORE 281-286 or participation in an off-campus program. The department encourages students to consider a community development minor.

Plant Science:

Foundation; Chemistry 101, 122 or *Chemistry 111, 225; Biology 125, 319, 324; Agriculture 201, 221, 311; Agriculture 251 or 255; Agriculture 315 or 316; one course from Agriculture 341-350. Agriculture 321 and 373 recommended. *Those considering graduate school should take Chemistry 111, 225 instead of Chemistry 101, 122.

General Minor--

Agriculture 101, 105, 111, 221, 290; Chemistry 101 or 111; CORE 266 or Economics 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 21-22).

Agriculture 101, 105, 111, 221, 290; Agriculture 201 or 232; three elective credits of agriculture; Chemistry 101 or 111; CORE 266 or Economics 202; CORE 200 (fulfills Core Program distribution elective).

For descriptions of EDUCATION majors, minors, fields of specialization, and teaching endorsements, see pages 78-93, Teacher Preparation Program.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Biology, Care, and Production of Domestic Animals (4)</td>
<td></td>
<td>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. Two lectures and one three-hour laboratory period per week.</td>
</tr>
<tr>
<td>105</td>
<td>Orientation and Agricultural Safety (1.5)</td>
<td></td>
<td>Fall, Spring Classroom discussion, lecture, and practical experience are used to familiarize the students with the Agriculture Department, Agricultural Stewardship Center (ASC), and the greenhouse to develop understanding and competency in operating equipment at the ASC and classroom labs. Students will receive instruction in agricultural safety to develop an 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 seven weeks. Two lectures and one three-hour laboratory per week.</td>
</tr>
<tr>
<td>106</td>
<td>Agricultural Operation and Experience (1.5)</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>111</td>
<td>Introduction to Plant Science (4)</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>201</td>
<td>Nature and Properties of Soils (3)</td>
<td></td>
<td>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 215; Chemistry 101 or 111.</td>
</tr>
<tr>
<td>221</td>
<td>Introduction to Farm Management and Accounting (3)</td>
<td></td>
<td>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: CORE 266 or Economics 202.</td>
</tr>
<tr>
<td>232</td>
<td>Feeds and Feeding (3)</td>
<td></td>
<td>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 111.</td>
</tr>
<tr>
<td>233</td>
<td>Principles of Dairy Science (3)</td>
<td></td>
<td>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 111. Agriculture 232 recommended.</td>
</tr>
<tr>
<td>234</td>
<td>Principles of Animal Health (3)</td>
<td></td>
<td>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 or 111. Biology 302 or 310 recommended.</td>
</tr>
<tr>
<td>235</td>
<td>Principles of Swine Science (3)</td>
<td></td>
<td>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 111. Agriculture 232 recommended.</td>
</tr>
<tr>
<td>238</td>
<td>Beef and Sheep Science (3)</td>
<td></td>
<td>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 111. Agriculture 232 recommended.</td>
</tr>
<tr>
<td>251</td>
<td>Horticultural Plants (3)</td>
<td></td>
<td>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 215.</td>
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</tbody>
</table>
| 252        | Planning Agriculture Education Programs (3)                                                                                                    |         | Occasional This course will cover the responsibilities of an agricultural education teacher, curriculum development, experiential learning opportuni-
ties including FFA and SAE, and assessment and maintenance of program quality. The course will emphasize the development of a distinctly Christian approach to teaching agricultural education. Students participate in an extensive, 40-clock hour, practicum experience in a local agriculture classroom, prepare a CDE team, and analyze and prepare components of a complete agriculture education program. Prerequisite: admission to the Teacher Preparation Program; or permission of instructor.

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 221 or Business Administration 205, 206.

281- Service-Learning (1-3) .............................................................................................................................Fall, Spring, Summer
328- See page 113, Individual Studies

290 Perspectives on Agricultural Economics, History, and Policy (3) ..........................................................................Fall, 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. CORE 266, Economics 202 or Political Science 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 125; Chemistry 122 or 212.

302 Methods of Teaching Agricultural Mechanics (3) ............................................................................................... Fall Even
Occasional Students will practice methods and management techniques in agricultural mechanics laboratories. Emphasis will be on safety, mechanical skills development, and management of students, facilities, equipment, and materials. Students participate in an extensive, 60-clock hour, practicum experience in a local agriculture classroom and laboratory to practice skills necessary to successfully teach agricultural mechanics. Prerequisite: admission to the Teacher Preparation Program; or permission of instructor.

303 Geographic Information Systems and Surveying (4) ............................................................................................ Fall Even
An introduction to the acquisition, analysis, display, manipulation, and management of geographic information. Course topics will include geographical data input, storage, maintenance, analysis, and retrieval. Students will utilize common GIS software and associated hardware. An overview of survey methods used to gather and quantify features of physical geography will be included. The course will meet in two studio lab classes to provide an integral learn-by-doing experience applying GPS technology, survey methods, 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 111.

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 215; Chemistry 101 or 111; junior standing.

316 Plant Protection - Weed Science and Plant Pathology (3) ...................................................................................... Spring Odd
A study of the major weed and plant pathology principles and their applications 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 215; Chemistry 101 or 111; 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; CORE 266 or Economics 202.
Prerequisites: Agriculture 101; Chemistry 101 or 111. The processes of converting muscle tissue into meat and factors affecting meat quality will be studied. The role of the producer, packer, production requirements. Two lectures and one three-hour laboratory per week for seven weeks. Prerequisites: Agriculture 232; Chemistry 122.

A problem-solving approach will be taken to examine the nutrient requirements of animals in different production systems. 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 101; Chemistry 101 or 111. Biology 324 recommended.

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 111.

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]

Courses vary from year to year and are designed to meet special student interests and utilize staff strengths and the talents of experts in the community. Each course covers material not usually treated in regularly scheduled courses.

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.

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 permission of instructor. [Cross-listed: CORE 311]

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. Two lectures and one three-hour laboratory per week. Prerequisites: Agriculture 101, 111 or Biology 122, 125, 215; Chemistry 101 or 111; junior or senior standing.

Students are given the opportunity to apply the principles of agriculture and business in an off-campus assignment. Prerequisite: sophomore, junior or senior standing.

Students will receive instruction and guidance for the development of a group agriculture capstone project. Student groups will identify a relevant problem, review background information, develop a project with an advisor, and gain its approval prior to implementation. A Capstone Agriculture Project Handbook will provide guidance for project expectations. Graded on a pass/no record basis. Prerequisites: Agriculture 101, 105, 111; Agriculture 290 or 370; junior or senior standing.

A continuation of Agriculture 380. The student groups will implement an approved capstone project, report the results of the project in
writing, and give a public oral presentation of their work. A Capstone Agriculture Project Handbook will provide guidance for project expectations. Prerequisite: Agriculture 380.

<table>
<thead>
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<th>Description</th>
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</thead>
<tbody>
<tr>
<td>393</td>
<td>Individual Studies (1-3)</td>
<td></td>
<td>Fall, Spring, Summer</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>See page 113, Individual Studies</td>
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</tbody>
</table>