

## Agribusiness and Production Systems CTAG Alignments

This document contains information about THREE (3) Career-Technical Articulation Numbers (CTANs) for the **Agribusiness and Production Systems** Career-Technical Assurance Guide (CTAG).

The CTANs are:

1. Crop Production
2. Soil Fertility and Fertilizers
3. Agribusiness Management

**1. Crop Production** CTAN alignment with the Agribusiness and Production Systems Pathway in the Agriculture and Environmental Systems Career Field Technical Content Standards of the Ohio Department of Education

**General Course Description:** Students will gain an understanding of the general principles involved in crop production, including soil, nutrients, plant breeding, planting techniques, tillage systems, pests, budgets, and environmental factors. Students will also learn the advantages and disadvantages of conventional, organic, and sustainable production systems.

**Advising Notes:**

- Student must access credit within 3 years of program completion or within currency of certificate

**Semester Credit Hours:** 3.0

**Alignment:**

Learning Outcomes signified with an asterisk (\*) are essential and must be taught.

<b>Learning Outcomes</b> <b>The student will be able to:</b>	The Ohio Department of Education Agriculture and Environmental Systems Career Field Competencies as aligned from the course titled: <b>Agonomic Systems (ODE Course Code 010620)</b>
1. Develop an understanding of crop production and then demonstrate this knowledge through the use of financial concepts.*	Outcome 1.6: Business Literacy  1.6.3 Explain the importance of planning your business. 1.6.11 Describe how all business activities of an organization work within the parameters of a budget.  <b>Outcome 1.8: Operations Management</b> 1.8.1 Forecast future resources and budgetary needs using financial documents (e.g., balance sheet, demand forecasting, financial ratios). 1.8.3 Analyze the performance of organizational activities and reallocate resources to achieve established 1.8.9 Develop a budget that reflects the strategies and goals of the organization. 1.8.10 Analyze how business management and environmental management systems (e.g., health, safety) contribute to continuous improvement and sustainability.  <b>Outcome 1.9: Financial Management</b> 1.9.1 Create, analyze, and interpret financial documents (e.g., budgets, income statements). 1.9.3 Review and summarize savings, investment strategies, and purchasing options (e.g., cash, lease, finance, stocks, bonds).  <b>Outcome 8.1: Plant Nutrition</b> 8.1.5 Collect soil and plant tissue for testing and analysis.  <b>Outcome 8.2: Plant Reproduction</b>

	<p>8.2.1 Identify the reproductive anatomy of plants and describe their physiological functions.</p> <p>8.2.2 Describe how biotic and abiotic factors (e.g., insects, light, temperature, microorganisms, moisture, location) influence and optimize plant reproduction.</p> <p>8.2.4 Select seeds and seed stock for desired traits.</p> <p><b>Outcome 8.4: Growth and Management</b></p> <p>8.4.3 Identify and classify seeds and plants at all stages of growth.</p> <p>8.4.4 Explain requirements necessary for photosynthesis to occur and identify the products and byproducts of photosynthesis.</p> <p><b>Outcome 8.5: Harvesting</b></p> <p>8.5.1 Identify characteristics of grains, seeds, vegetables, fruits and ornamental plants that indicate crop maturity.</p> <p>8.5.4 Evaluate techniques to maximize yield through mechanical or hand harvesting methods.</p> <p>8.5.5 Calculate potential yield and loss due to harvesting.</p> <p>8.5.7 Identify harvesting methods and harvesting equipment.</p> <p>8.5.8 Assess the stage of growth to determine maturity and salability of grains, seeds, vegetables, fruits and ornamental plants.</p> <p>8.5.11 Evaluate crop yield and loss data</p>
<p>2. Compare and contrast the differences that exist among agricultural production systems and translate these differences into costs and returns for farmers, consumers and the environment.*</p>	<p><b>Outcome 6.1: Soils</b></p> <p>6.1.2 Describe the relationship among physical properties of soils.</p> <p>6.1.5 Determine land use and identify land capabilities classes.</p> <p>6.1.6. Apply soil conservation practices to reduce soil erosion and compaction.</p> <p>6.1.7 Compare and contrast the causes and effects of soil erosion.</p> <p>6.1.8 Describe soil limitations in agronomic, urban and natural resource practices.</p> <p>6.1.9 Evaluate soil survey data and implement management decisions.</p> <p><b>Outcome 8.1: Plant Nutrition</b></p> <p>8.1.4 Identify symptoms and causes of plant nutrient deficiencies and toxicities.</p> <p>8.1.6 Analyze and draw conclusions from soil and plant tissue test data.</p> <p><b>Outcome 8.3: Pest Management</b></p> <p>8.3.1 Identify and classify insect, weed, disease, and animal pests.</p> <p>8.3.3 Analyze and calculate the economic threshold of pest damage.</p> <p>8.3.5 Evaluate the effectiveness of a pest management plan</p> <p>8.3.10 Select application methods and implement an Integrated Pest Management plan.</p> <p><b>Outcome 8.5: Harvesting</b></p> <p>8.5.11 Evaluate crop yield and loss data</p> <p><b>Outcome 8.6: Handling and Storage</b></p> <p>8.6.3 Apply harvesting, handling and storage techniques to minimize loss and maximize economic return.</p> <p>8.6.4 Calculate potential yield and loss due to processing and storage.</p>

<p>3. Compare and contrast conventional, sustainable, and organic agronomic production systems.*</p>	<p><b>Outcome 6.1: Soils</b></p> <p>6.1.2 Describe the relationship among physical properties of soils.</p> <p>6.1.5. Determine land use and identify land capabilities classes.</p> <p>6.1.7. Compare and contrast the causes and effects of soil erosion.</p> <p><b>Outcome 8.1: Plant Nutrition</b></p> <p>8.1.3 Determine nutrient requirements of plants.</p> <p>8.1.7 Distinguish between biotic and abiotic factors (e.g., minerals, pH, microorganisms) that influence and optimize the availability of nutrients for plants.</p> <p>8.1.8 Calculate nutrient requirements and select nutrient sources and additives for optimum economic return.</p> <p>8.1.9 Determine the nutrient content of organic and inorganic fertilizers.</p>
<p>4. Compare and contrast tillage systems. *</p>	<p><b>Outcome 6.10: Ecosystems</b></p> <p>6.10.3 Identify and classify interactions among organisms, including predation, symbiosis, and competition to determine a species interdependent relationships.</p> <p>6.10.4 Describe the process of succession and its impact on ecosystems</p> <p>6.10.5 Connect biotic interactions with the abiotic environment.</p> <p>6.10.6 Describe biogeochemical cycles (e.g., carbon, nitrogen, phosphorous, hydrological) and their roles in maintaining equilibrium in an ecosystem.</p> <p>6.10.7 Identify interactions of ecosystems to differentiate biomes.</p> <p>6.10.8 Select and implement restoration ecology practices to repair damaged ecosystems.</p> <p><b>Outcome 8.1: Plant Nutrition</b></p> <p>8.1.5 Collect soil and plant tissue for testing and analysis.</p>
<p>5. Describe the processes involved in the evolution of seeds to plants and explain the impact of the environment on the physiology and structure of plants.</p>	<p><b>Outcome 8.1: Plant Nutrition</b></p> <p>8.1.8 Calculate nutrient requirements and select nutrient sources and additives for optimum economic return.</p> <p>8.1.10 Select the methods, time of nutrient application, and apply nutrients.</p> <p><b>Outcome 8.2: Plant Reproduction</b></p> <p>8.2.4 Select seeds and seed stock for desired traits.</p> <p>8.2.5 Select and apply methods that create desired traits in seeds.</p> <p><b>Outcome 8.3: Pest Management</b></p> <p>8.3.5 Evaluate the effectiveness of a pest management plan.</p> <p><b>Outcome 8.4: Growth and Management</b></p> <p>8.4.1 Identify and classify plants using taxonomy.</p> <p>8.4.2 Identify plant anatomical structures and tissues.</p> <p>8.4.3 Identify and classify seeds and plants at all stages of growth.</p> <p>8.4.4 Explain requirements necessary for photosynthesis to occur and identify the products and byproducts of photosynthesis.</p>

**2. Soil Fertility and Fertilizers** CTAN alignment with the Agribusiness and Production Systems Pathway in the Agriculture and Environmental Systems Career Field Technical Content Standards of the Ohio Department of Education

**General Course Description:** Students will learn the nutrient requirements that plants require from soil and they will learn to identify plant symptoms that develop when these nutrients are deficient. In addition, students will collect soil samples and analyze the nutrient contents of soil to determine nutrients that can be added to enhance plant growth.

**Advising Notes:**

- Student must access credit within 3 years of program completion or within currency of certificate

**Semester Credit Hours:** 3.0

**Alignment:**

Learning Outcomes signified with an asterisk (\*) are essential and must be taught.

<p><b>Learning Outcomes</b></p> <p><b>The student will be able to:</b></p>	<p>The Ohio Department of Education Agriculture and Environmental Systems Career Field</p> <p>Competencies as aligned from the course titled: <b>Greenhouse &amp; Nursery Mgt. (ODE Course Code 010610)</b></p>
<p>1. Identify nutrients that are essential for plant growth and describe the contributions these nutrients make to growth over the life cycle of plants.*</p>	<p><b>Outcome 8.1: Plant Nutrition</b></p> <p>8.1.1 Compare and contrast organic and inorganic sources of macronutrients and micronutrients.</p> <p>8.1.2 Describe the functions of macronutrients, micronutrients in plants and the role that microorganisms play in plant nutrition.</p> <p>8.1.3 Determine nutrient requirements of plants.</p> <p>8.1.4 Identify symptoms and causes of plant nutrient deficiencies and toxicities.</p>
<p>2. Identify symptoms that develop from nutrient deficiency and describe the remedies that are needed to address these deficiencies. *</p>	<p><b>Outcome 8.1: Plant Nutrition</b></p> <p>8.1.3 Determine nutrient requirements of plants.</p> <p>8.1.4 Identify symptoms and causes of plant nutrient deficiencies and toxicities.</p> <p>8.1.6 Analyze and draw conclusions from soil and plant tissue test data.</p>
<p>3. Describe the process by which soil nutrients interact according to soil type. *</p>	<p><b>Outcome 6.1: Soils</b></p> <p>6.1.2. Describe the relationship among physical properties of soils.</p> <p>6.1.3. Collect, test and analyze soil samples for physical and chemical properties.</p> <p>6.1.4. Identify factors (e.g., climate, vegetation, soil texture, drainage, management practices, landscape) affecting organic matter and its function in soil quality</p> <p><b>Outcome 8.1: Plant Nutrition</b></p> <p>8.1.7 Distinguish between biotic and abiotic factors (e.g., minerals, pH, microorganisms) that influence and</p>

	<p>optimize the availability of nutrients for plants.</p> <p>8.1.8 Calculate nutrient requirements and select nutrient sources and additives for optimum economic return.</p> <p>8.1.9 Determine the nutrient content of organic and inorganic fertilizers.</p> <p>8.1.10 Select the methods, time of nutrient application, and apply nutrients.</p>
<p>4. Explain the procedures involved in soil sampling and analysis and develop the capacity to conduct and interpret soil analyses to determine needed ingredients. *</p>	<p><b>Outcome 3.8: Research and Experiments</b></p> <p>3.8.4 Establish and implement procedures for systematic collection, organization, and use of data.</p> <p>3.8.5 Select and apply sampling methods that appropriately represent the population to be studied.</p> <p><b>Outcome 8.1: Plant Nutrition</b></p> <p>8.1.5 Collect soil and plant tissue for testing and analysis.</p> <p>8.1.8 Calculate nutrient requirements and select nutrient sources and additives for optimum economic return.</p> <p>8.1.10 Select the methods, time of nutrient application, and apply nutrients.</p>

3. **Agribusiness Management** CTAN alignment with the Agribusiness and Production Systems Pathway in the Agriculture and Environmental Systems Career Field Technical Content Standards of the Ohio Department of Education

**General Course Description:** Students will develop skills in the areas of finance; management and marketing that are critical to the success of an agribusiness firm. These skills will involve an understanding of concepts such as bids, budgets, business plans, cash flows, contracts, inventory controls, marketing plans, supply chain, negotiations, and strategic alternatives.

**Advising Notes:**

- Must access credit within 3 years of program completion or within currency of certificate

**Semester Credit Hours:** 3.0

**Alignment:**

Learning Outcomes signified with an asterisk (\*) are essential and must be taught.

<p><b>Learning Outcomes</b> <b>The student will be able to:</b></p>	<p>The Ohio Department of Education Agriculture and Environmental Systems Career Field Competencies as aligned from the course titled: <b>Business Management for Agricultural and Environmental Systems (ODE Course Code 010115)</b></p>
<p>1. Compare and contrast the characteristics of agribusiness firms by structure, common organizational strategies, business type, and size.*</p>	<p><b>Outcome 1.6: Business Literacy</b></p> <p>1.6.1 Identify business opportunities.</p> <p>1.6.3 Explain the importance of planning your business.</p> <p>1.6.4 Identify types of businesses, ownership and entities (i.e., individual proprietorships, partnerships, corporations, cooperatives, public, private, profit, not-for-profit)</p> <p>1.6.5 Describe organizational structure, chain of command, the roles, and responsibilities of the organizational department's interdepartmental interactions.</p> <p><b>Outcome 1.7: Entrepreneurship/ Entrepreneurs</b></p> <p>1.7.1 Compare and contrast the four types of business ownership (i.e., individual proprietorships, partnerships, corporations, cooperatives).</p> <p>1.7.5 Develop a business plan.</p>
<p>2. Identify and explain the major components of an agribusiness firm with respect to finance, marketing, and management.*</p>	<p><b>Outcome 1.6: Business Literacy</b></p> <p>1.6.2 Assess the reality of becoming an entrepreneur, including advantages and disadvantages (e.g., risk versus reward, reasons for success and failure).</p> <p>1.6.4 Identify types of businesses, ownership and entities (i.e., individual proprietorships, partnerships, corporations, cooperatives, public, private, profit, not-for-profit)</p> <p>1.6.6 Identify the target market served by the organization, the niche that the organization fills and an outlook of the industry.</p> <p>1.6.7 Identify the effect of supply and demand on products and services.</p> <p>1.6.8 Identify the features and benefits that make an organization's product or service competitive.</p> <p><b>Outcome 1.8: Operations Management</b></p> <p>1.8.1 Forecast future resources and budgetary needs using financial documents (e.g., balance sheet, demand forecasting, financial ratios).</p>

	<p>1.8.2 Select and organize resources to develop a product or a service.</p> <p>1.8.9 Develop a budget that reflects the strategies and goals of the organization.</p> <p><b>Outcome 1.9: Financial Management</b></p> <p>1.9.4 Identify credit types and their uses in order to establish credit.</p> <p>1.9.5 Identify ways to avoid or correct debt problems.</p> <p>1.9.6 Explain how credit ratings and the criteria lenders use to evaluate repayment capacity affect access to loans.</p> <p>1.9.9 Compare and contrast different banking services available through financial institutions.</p> <p>1.9.10 Identify the role of depreciation in tax planning and liability.</p> <p><b>Outcome 1.10: Sales and Marketing</b></p> <p>1.10.1 Identify how the roles of sales, advertising and public relations contribute to a company's brand.</p> <p>1.10.2 Determine the customer's needs and identify solutions.</p> <p>1.10.3 Communicate features, benefits, and warranties of a product or service to the customer.</p> <p>1.10.6 Discuss the importance of correct pricing to support a product's or service's positioning in the marketing mix.</p> <p>1.10.9 Describe how product mix (e.g., product line, product items) maximizes sales revenues, market, share, and profit margin.</p>
<p>3. Identify and interpret the supply chain management of operating an agribusiness firm with respect to budgeting, financing, successful negotiations, bidding, contracting, inventory control, and adequate cash flows.*</p>	<p><b>Outcome 1.8: Operations Management</b></p> <p>1.8.2 Select and organize resources to develop a product or a service.</p> <p>1.8.5 Use inventory and control systems to purchase materials, supplies and equipment (e.g., Last In, First Out [LIFO]; First In, First Out [FIFO]; Just in Time [JIT]; LEAN).</p> <p>1.8.6 Identify the advantages and disadvantages of carrying cost and Just-in-Time (JIT) production systems and the effects of maintaining inventory (e.g., perishable, shrinkage, insurance) on profitability.</p> <p>1.8.10 Analyze how business management and environmental management systems (e.g., health, safety) contribute to continuous improvement and sustainability.</p> <p><b>Outcome 1.9: Financial Management</b></p> <p>1.9.1 Create, analyze, and interpret financial documents (e.g., budgets, income statements).</p> <p>1.9.5 Identify ways to avoid or correct debt problems.</p>
<p>4. Explain the interrelationship of a business plan, and an effective human resource management plan.*</p>	<p><b>Outcome 1.6: Business Literacy</b></p> <p>1.6.9 Explain how the performance of an employee, a department and an organization is assessed.</p> <p>1.6.10 Describe the impact of globalization on an enterprise or</p>

	<p>organization.</p> <p>1.6.11 Describe how all business activities of an organization work within the parameters of a budget.</p> <p>1.6.12 Describe classifications of employee benefits, rights, deductions and compensations</p> <p><b>Outcome 1.7: Entrepreneurship/ Entrepreneurs</b></p> <p>1.7.2 Explain the role of profit as the incentive to entrepreneurs in a market economy.</p> <p><b>Outcome 1.8: Operations Management</b></p> <p>1.8.3 Analyze the performance of organizational activities and reallocate resources to achieve established goals.</p> <p>1.8.4 Identify alternative actions to take when goals are not met (e.g., changing goals, changing strategies, efficiencies).</p> <p>1.8.7 Collect information and feedback to help assess the organization's strategic planning and policymaking processes.</p> <p>1.8.8 Identify routine activities for maintaining business facilities and equipment.</p> <p>1.8.10 Analyze how business management and environmental management systems (e.g., health, safety) contribute to continuous improvement and sustainability.</p>
<p>5. Develop a comprehensive business plan.*</p>	<p><b>Outcome 1.8: Operations Management</b></p> <p>1.8.3 Analyze the performance of organizational activities and reallocate resources to achieve established goals.</p> <p>1.8.4 Identify alternative actions to take when goals are not met (e.g., changing goals, changing strategies, efficiencies).</p>