Alabama Department of Postsecondary Education

Representing the Alabama Community College System

STATEWIDE CAREER/TECHNICAL EDUCATION COURSE ARTICULATION REVIEW MINUTES

Articulation Agreement Identifier: HOC 110 (2006-1)HOC 120 (2006-1) Identifier is the postsecondary course prefix followed by Plan-of-Instruction version number (e.g.; INT 100 (2005-1)).

Applicable CIP code(s): 01.0101, 01.0301, 01.0601, 01.0603, 01.0605, and 01.0607

Postsecondary course prefix, number, and title: HOC 110, OHT 110, LOM 110, TRF 110, AGR 101, AGP 101 - Introduction to Horticulture and HOC 120, AGR 220, LOM 120 - Plant Propagation

Secondary Education course(s) title and number: 010601/420051 - Horticultural Science + 010604/420054 - Greenhouse Production and Management (Course #010604) **OR** 010601/420051 - Horticultural Science + 010605/420055 - Nursery Production

Initial Review: February 4, 2010 DPE Annual Review: March 8, 2012

Effective date**: Fall Semester 2011**.

Course Content Analysis (all postsecondary course objectives must be sufficiently addressed in the secondary courses):

Notes:

1. **Skills and knowledge contained in the postsecondary course objectives must be present in the corresponding secondary objectives for a "match" to occur.**
2. **Postsecondary and Secondary objectives must reflect similar content and performance levels before the course articulation agreement will be recommended to the TEDAC Oversight Committee.**
3. **More than one Secondary course may be used in order to articulate to a Postsecondary course.**

Postsecondary Course Objectives	Secondary Objectives and Location(s)	TEDAC Comments
HOC 110, OHT 110, LOM 110, TRF 110, AGR 101, AGP 101 - INTRODUCTION TO HORTICULTURE **MODULE A – INTRODUCTION TO HORTICULTURE INDUSTRIES** **A1.0 Explain career differences in the Horticulture Industry.** A1.1 This competency is measured cognitively. A1.1.1 Identify at least five major horticultural fields. A1.1.2 Identify horticultural careers within fields. A1.1.3 Describe the working conditions in at least five horticulture careers. A1.1.4 Identify the general aptitudes and skills in various horticulture careers. A1.1.5 Identify the physical demands of various horticulture careers. **MODULE B – SAFETY PRACTICES IN HORTICULTURE** **B1.0 Practice safety while engaged horticultural work.** B1.1 This competency is measured cognitively. B1.1.1 Identify personal safety risk factors. B1.1.2 Explain proper use of personal protective equipment. B1.1.3 Describe risk factors and proper use of horticulture equipment. B1.1.4 Describe risks and risk reduction practices in the horticulture environment. B1.1.5 Describe risks and risk reduction practices associated with chemicals commonly used in horticulture. **MODULE C – BASIC BOTANY** **C1.0 Explain the concepts of basic botany.** C1.1 This competency is measured cognitively.	**Horticultural Science** **Unit 1 – Career Opportunities** **Content Standards:** 1. Explain the importance of horticulture to local, state, national and world economics. 2. Identify careers in horticulture. **Learning Objectives:** 1. Research and identify jobs that relate to the turf industry. 2. Discuss educational requirements for different jobs in the industry. 3. Discuss working conditions. 4. Fill out job applications and write resumes. 5. Discuss the history of the horticulture industry. 6. Discuss how knowledge of the horticulture industry can be used to make a living. 7. Identify skills that are used in the turf industry. **Unit 2 – Safety** **Content Standards:** 3. Describe safety practices in horticulture. **Learning Objectives:** 1. Explain why accidents occur. 2. Explain the importance of safety in horticulture. 3. Describe ways to prevent accidents. 4. Identify personal protective equipment and how it is used. 5. Identify safety precautions when using hand and power tools. 6. Identify safety precautions necessary when handling, applying, and storing chemicals. **Unit 3 – Plant Physiology** **Content Standards:** 4. Describe vegetative structures and functions in annuals, biennials, and perennials.	

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C1.1.1	Define terms related to anatomical structure of plants.	Examples: root for plant anchor and support, stem for plant support, leaf for photosynthesis and respiration	
C1.1.2	Explain the function of plant parts.	• Identifying sexual reproductive structures and functions of plants	
C1.1.3	Identify the vegetative and reproductive plant parts.	Examples: flower, fruit, seed	
C1.1.4	Describe the growth of a plant by cell division and cell enlargement.	• Identifying asexual reproductive structures and functions of plants	
C1.1.5	Describe the system of plant classification.	Examples: stem, root, leaf	
C1.1.6	Define the terms used in plant taxonomy.	5. Describe the purpose and use of growth regulators.	
C1.1.7	Identify the features of the binomial nomenclature system.	**Learning Objectives:**	
		1. Identify sexual reproductive structures and functions of plants.	
C1.1.8	Explain the binomial nomenclature system.	2. Identify asexual reproductive structures and functions of plants.	
C1.1.9	Write the formula for photosynthesis and respiration.	3. Identify plant growth regulators (PGR) and their functions.	
		Unit 4 – Growing Media	
C1.1.10	Explain the formula for photosynthesis and respiration.	**Content Standards:**	
		6. Differentiate soil from soilless media in the horticulture industry.	
C1.1.11	Define the terms used in plant taxonomy.	7. Identify components of soil.	
C1.1.12	Describe the process of plant reproduction.	Examples: sand, silt, clay	
C1.1.13	Describe the process of transpiration and water relations.	8. List macronutrients and micronutrients needed for plant growth.	
		• Identifying the function of macronutrients and micronutrients	
MODULE D – GENERAL PLANT CARE AND CULTURE		Examples: major macronutrients—nitrogen, phosphorus, potassium secondary macronutrients—calcium, sulfur, magnesium micronutrients—zinc, iron, boron, copper, manganese, carbon, hydrogen, oxygen, molybdenum, chloride	
D1.0	**Provide for proper plant care and maintenance.**		
D1.1	This competency is measured cognitively.	• Recognizing common nutrient deficiency symptoms	
D1.1.1	Explain standard practices for the care and maintenance of plants.	9. Design short- and long term fertilization plans based on information provided by a soil test.	
D1.1.2	Define environmental terminology.	• Comparing organic and inorganic fertilizers	
D1.1.3	Explain how environmental factors effect plant growth.	• Demonstrating fertilizer application methods	
		• Describing pH modification procedures	
		Learning Objectives:	
HOC 120, OHT 120, AGR 220, LOM 120 - PLANT PROPAGATION		1. Identify the types of growing media.	
MODULE A – INTRODUCTION TO PLANT PROPAGATION		2. Describe the components of soil.	
A1.0	**Explain concepts related to plant propagation.**	3. Identify macronutrients and micronutrients and list their deficiencies.	

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A1.1.1 Define terms associated with plant propagation. A1.1.2 Explain safety concerns associated with plant propagation. A1.1.3 Explain use of tools, materials, and structures used for plant propagation. A1.1.4 Explain the importance of keeping accurate plant propagation records. A1.1.5 Describe critical items included in documenting plant propagation. **MODULE B – SEXUAL PLANT PROPAGATION** **B1.0 Use various techniques to propagate plants from seeds.** **B1.1 Pollinate plants.** B1.1.1 Identify parts of flowers. B1.1.2 Diagram genetic crosses between various plants. B1.1.3 Explain the role of pollination and fertilization in sexual plant propagation. B1.1.4 Explain the process of pollination and fertilization. **B1.2 Harvest and store seeds.** B1.2.1 Identify types of seeds. B1.2.2 Identify parts of seeds. B1.2.3 Explain the process of seed germination. B1.2.4 Identify dormancy factors. B1.2.5 Explain various processes for harvesting seeds. B1.2.6 Explain seed treatment techniques. B1.2.7 Explain techniques to store seeds. **B1.3 Grow plants from seeds.** B1.3.1 Identify materials for starting plants from seeds. B1.3.2 Explain the process of starting various plants from seeds. **B1.4 Document plant propagation activities and results.** **MODULE C – ASEXUAL PLANT PROPAGATION** **C1.0 Use various techniques to propagate plants through asexual methods.** **C1.1 Propagate plants using asexual techniques.**	4. Explain the use of fertilizers. **Unit 5 – Greenhouse Facilities** **Content Standards:** 1. Identify greenhouse designs. 2. Review considerations for greenhouse frameworks. 3. Identify and describe greenhouse glazing materials. 4. Describe the functions of the head house. 5. Discuss the advantages of retractable-roof greenhouses. 6. Describe greenhouse bench options. 7. Discuss the advantages of automated systems. Examples: planting and irrigation systems **Unit 6 - Greenhouse and Nursery Crop Production** **Content Standards:** 11. Design greenhouse and nursery crop production schedules. 12. Compare container and field nurseries. 13. Describe techniques for maintaining plants, including pruning, mulching, fertilizing, and irrigating. **Learning Objectives:** 1. Determine the benefits of a greenhouse and nursery production schedule. 2. Discuss the advantages and disadvantages of container and field nurseries. 3. Set up a growth control schedule optimize plant growth. **Unit 7 - Plant Identification and Classification** **Content Standards:** 14. Identify common names of greenhouse and nursery plants. • Explaining the importance of the binomial classification system **Learning Objectives:** 1. Explain the importance of the binomial classification system.	

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C1.1.1	Explain the anatomical and physiological basis of asexual propagation.	2. List, describe and identify the major parts of the plant. 3. Explain the major structural difference between monocot and dicot stems. **Unit 8 – Pest Management** **Content Standards:** 15. Identify plant damage caused by insects. • Describing types of pesticides Examples: herbicides, miticides, insecticides, fungicides, rodenticides, molluscides, nematocides • Describing the Integrated Pest Management (IPM) concept • Identifying practices required in the safe use of pesticides **Learning Objectives:** 1. Demonstrate an understanding of factors that affect the dynamic equilibrium of populations and ecosystems. **Unit 10 - Technological Application** **Content Standards:** 18. Utilize various technologies in the horticulture industry. Examples: computers, computer software, watering timers, sensors **Learning Objectives:** 1. Describe some general applications of computers in agribusiness management. Examples: Computer applications, agricultural accounting and management systems. 2. Discuss the advantages of automated planting, irrigation, and plant transporting systems. 3. Identify greenhouse climate control systems. **Greenhouse Production and Management** **Unit – 3 – Plant Propagation** **Content Standards** 3. Demonstrate propagation methods for greenhouse plants. 4. Practice seed germination techniques in greenhouse operations.	
C1.1.2	Identify techniques of asexual plant propagation.		
C1.1.3	Identify types of plant cuttings.		
C1.1.4	Explain the processes of selecting, handling, and preparing cuttings.		
C1.1.5	Explain the environmental requirements for rooting cuttings.		
C1.2	**Document plant propagation activities and results**		

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	Learning Objectives: 1. Explain sexual reproduction in plants. 2. Describe the conditions for seed germination. 3. Explain asexual reproduction. 4. Discuss and identify the various methods of stem cutting. 5. Describe the Methods of Leaf and Leaf Bud Cutting. 6. Describe grafting and the common methods of grafting. 7. Explain layering and the separation between layering and division. 8. Explain tissue culture. 9. Demonstrate techniques of propagation by seed. **Unit 4 – Growing Media** **Content Standards:** 3. Adjust Greenhouse Growing Media Properties by Adding Amendments. • Adjusting the pH of greenhouse growing media 4. Prepare Growing Media Mixtures for Greenhouse Plants. **Learning Objectives:** 1. Describe pH and how it is modified. 2. Discuss the addition of limestone and sulfur. 3. Explain fertilization and fertilizer. 4. Explain and Identify growing media. 5. Describe soil materials and structure. **Unit 5 – Plant Identification** **Content Standards:** 3. Identify the twelve plant kingdom divisions. Classifying native Alabama plants using dichotomous keys. 4. Describe phylogenetic relationships between plants and other organisms. • Classifying plants as vascular or nonvascular • Classifying seed-bearing and spore-bearing plants • Classifying plants as gymnosperms or angiosperms Contrasting monocots dicots Describe mutualism among algae and fungi in lichens 5. List plant adaptations required for life on land.	

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	• Describing the alternation of generations in plants • Comparing characteristics of algae and plants 6. Identify major types of plant tissues found in roots, stems, and leaves. Examples: parenchyma, sclerenchyma, collenchyma • Critiquing tissue culturing procedures Example: callus production 7. Identify roots, stems, and leaves. Examples: roots-tap, fibrous stems-herbaceous, woody leaves-simple, compound 8. Explain the importance of soil type, texture, and nutrients to plant growth. • Describing water and mineral absorption plants • Analyzing the roles of capillarity and turgor pressure • Using hydroponics for growing plants 9. Explain plant cell processes, including light-dependant and light independent reactions of photosynthesis, glycolysis, aerobic respiration, and transport. 10. Describe plant responses to various stimuli. • Identifying effects of hormones on plant growth Examples: gibberellin, cytokinin, auxin • Differentiating among phototropism, gravitropism, and thigmotropism • Propogating plants with cuttings and commercially available rooting hormones for prop plants with cuttings 11. Identify life cycles of mosses, ferns, gymnosperms, and angiosperms. 12. Describe the structure and function of flower parts. • Describing seed germination, development, and dispersal • Germinating monocot and dicot seeds • Dissecting seed types to compare anatomical characteristics • Comparing the germination rates of various seeds 13. Describe various natural and artificial methods of vegetative	

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	propagation. Examples: natural- stem runners, rhizomes, bulbs, tubers artificial- cutting, grafting, layering • Monitoring asexual plant propagation through leaf and stem cuttings 14. Describe the ecological and economic importance of plants. Examples: ecological-algae-producing oxygen, bioremediation, soil preservation economic-food, medication, timber, fossil fuels, clothing • Analyzing effects of human activity on the plant world 15. Identify viral, fungal, and bacterial plant diseases and their effects. Examples: viral-tobacco mosaic, Rembrandt tulips; fungal-mildew, rust bacterial-black rot **Learning Objectives:** 1. Describe the system used in the classification of native Alabama plants. 2. Classify native Alabama plants using dichotomous keys. 3. Describe the difference between vascular and nonvascular plants. 4. Determine if plants are seed bearing or spore bearing. 5. Determine if plants are gymnosperms or angiosperms. 6. Describe the differences between monocots and dicots. 7. Determine the mutual relationship among algae and fungi in lichens. 8. Discuss the alternation of generations of plants. 9. Compare the characteristics of plants and algae. 10. Describe the techniques of tissue culture. 11. Discuss the plant tissues in the roots, stems and leaves. 12. Explain the variations found in root structures, stems, and leaves.	

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	13. Trace the movement of minerals, water, and nutrients in plants. 14. Identify the requirements for hydroponics plant production. 15. Describe the various hydroponics systems. 16. Compare the activity in a plant during exposure to light and periods of darkness. 17. Identify plant growth regulators and their functions. 18. Explain plant tropisms. 19. Describe commercial uses of plant growth regulators. 20. Discuss the various life-cycles of plants. 21. Explain the differences in sexual and asexual reproduction in plants. 22. Discuss the differences between monocot and dicot. 23. Identify the major parts of seeds and their function. 24. Compare the germination rate of seeds. 25. State the primary methods of asexual reproduction and give examples of plants typically propagated by each method. 26. Explain environment and the issues associated with maintaining a good environment. 27. Explain the ecological and economical importance of plants. 28. Define plant disease and identify the conditions necessary for a plant disease to develop. **Unit 6 – Greenhouse Production** **Content Standards:** 8. Differentiate among environmental factors affecting greenhouse plant growth. • Controlling environmental conditions for plant growth in the greenhouse Examples: temperature control, ventilation, watering 9. Produce seasonal greenhouse crops. Examples: winter- poinsettias spring-trumpet lilies 10. Identify common greenhouse plant disorders. Examples: root rot, insect damage, fungus 11. Select types of fertilizer and methods of application used in greenhouse production.	

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	Learning Objectives: 1. Describe the effects of light on plants. 2. Describe a plant's temperature needs. 3. Explain how the quality of air affects plants. 4. Describe a plants water needs. 5. Describe the importance and scope of the bedding plant industry. 6. Describe the importance and scope of scope of the foliage plant industry. 7. Explain the production practices used in growing bedding plants. 8 Explain the production practices used in growing foliage plants. 9. Describe the production practices for potted tulips, amaryllis etc. 10. Discuss the factors involved in getting bedding plants started. 11. Describe techniques used to force daffodils, hyacinths, crocus, dwarf iris, grape-hyacinth, and lilies. 12. Explain practices used in caring for foliage plants in the home or office. 13. Discuss how diseases can be controlled in fruit and vegetable gardens. 14. Discuss how insects can be controlled in fruit and vegetable gardens. 15. Discuss how weeds can be controlled in fruit and vegetable gardens 16. Identify the major categories of pests found in the greenhouse. 17. Discuss pest control techniques used in a greenhouse. 18. Describe the different practices of integrated pest management used in the greenhouse. 19. Describe the classification of plant diseases. 20. Explain scouting, identification, and diagnosis of plant diseases. 21. Explain control of plant diseases. 22. Identify strategies used in disease management. **Unit 7 – Greenhouse Pest Control** **Content Standards:**	

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	12. Apply Pesticides to Greenhouse Crops. • Identifying safety and first aid precautions in greenhouse management • Using correct pesticides for intended target in greenhouse management • Disposing of containers and leftover pesticide mixtures according to Environmental Protection Agency (EPA) standards **Learning Objectives:** 1. Discuss Materials Safety Data Sheets for greenhouse pests. 2. Discuss first-aid procedures and precautions for greenhouse pesticides. 3. Explain how to properly calibrate equipment used in applying pesticides. 4. Discuss correct procedure for matching the pesticide to the pest. 5. Discuss the correct procedure for disposing of leftover pesticides and containers. **Unit 8 – business Management** **Content Standards** 13. Select quality greenhouse plants for marketing. 14. Demonstrate managerial skills for successfully operating a greenhouse business. **Learning Objectives:** 1. Explain how plant species are selected for production and how quantities are determined. 2. Discuss planting regions throughout the country. 3. Define total quality management. 4. Explain the empowerment of employees. 5. Distinguish between internal and external customers. 6. Outline the steps in a total quality management program. **Unit 9 - Greenhouse Equipment and Facilities** **Content Standards:** 15. Maintain greenhouse facilities. 16. Maintain equipment used in greenhouse operations. **Learning Objectives:**	

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	1. List and compare five types of growing structures. 2. List the characteristics of various greenhouse coverings. 3. List advantages and disadvantages of heating units. 4. Describe common tools required for greenhouse operations. 5. Describe safety precautions for using power tools. 6. Discuss steps in maintaining tools and equipment. **Nursery Production and Management** **Unit 3 – Basic Plant Science** **Content Standards:** 3. Differentiate among environmental factors affecting nursery plant growth. 4. Describe uses of primary, secondary, and trace nutrients. Examples: primary nutrients—nitrogen, phosphorus, potassium secondary nutrients—magnesium, calcium, sulfur trace nutrients—iron, manganese, boron, molybdenum, copper, zinc, chloride, aluminum 5. Interpret results of a soil analysis. • Differentiating among components of soil Examples: sand, silt, clay • Describing methods for adjusting pH • Calculating the amount of fertilizer needed for nursery crops **Learning Objectives:** 1. Different environmental factors affecting nursery plant growth. 2. Describe the uses of primary, secondary, and trace nutrients. 3. Interpret results of a soil analysis. **Unit 4 – Plant Propagation** **Content Standards:** 6. Demonstrate propagation methods for nursery plants.	

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	Learning Objectives: 1. Explain the difference between sexual and asexual propagation methods. 2. Demonstrate the primary methods of sexual propagation. 3. Demonstrate the various methods of asexual propagation. **Unit 5 – Nursery Crop Growing Media** **Content Standards:** 7. Adjust nursery growing media properties by adding amendments. 8. Prepare growing media mixtures for nursery plants. **Learning Objectives:** 1. Describe pH and how it is modified. 2. Discuss the addition of limestone and sulfur. 3. Explain fertilization and fertilizer. 4. Explain and identify growing media. 5. Describe soil materials and structure. **Unit 6 – Plant Identification** **Content Standards:** 9. Identify nursery plants by common name. **Learning Objectives:** 1. Explain ways plants are identified. 2. Describe the parts and function of plant parts. **Unit 7 – Nursery Production** **Content Standards:** 10. Control environmental conditions for plant growth in the nursery industry. Examples: temperature, ventilation, water, light 11. Produce nursery crops. 12. Identify nursery plant problems. Examples: root rot, insect damage, fungus 13. Select types of fertilizers and methods of application used in	

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	nursery production. **Learning Objectives:** 1. Determine ways to control environmental conditions in the nursery industry. 2. Explain ways nursery crops are produced. 3. Identify nursery plant problems. 4. Select types of fertilizers and methods of application used in nursery production. **Unit 8 – Nursery Pest Control** **Content Standards:** 14. Apply pesticides to nursery crops. • Identifying safety and first aid precautions in nursery crop production • Selecting correct pesticides for intended targets in nursery crop production • Disposing of containers and left-over pesticide mixtures according to Environmental Protection Agency (EPA) standards in nursery crop production **Learning Objectives:** 1. Discuss Material Safety Data Sheets. 2. Discuss first-aid procedures and precautions in nursery crop production. 3. Identify the major classifications of pesticides and their use. 4. Discuss proper disposal methods for left-over containers and pesticide mixtures according to EPA standards in crop production. **Unit 9 – Business Management** **Content Control** 15. Select quality nursery plants for marketing. 16. Demonstrate managerial skills needed for successful operation of a nursery business. **Learning Objectives:** 1. Describe labeling, pricing, displaying, and advertising in relation	

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	to marketing nursery plants. 2. Explain how to prepare a business plan. 3. Describe the functions of management. 4. Describe ways of doing business. **Unit 10 – Equipment and Facilities** **Content Standards:** 17. Demonstrate maintenance of nursery crop growing facilities, including propagation structures, greenhouses, shade houses, and mist equipment. 18. Maintain power equipment used in nursery operations. **Learning Objectives:** 1. Explain the different types of growing facilities and explain major maintenance requirements. A. cold frame B. hotbed C. greenhouses D. hoop-houses E. shade-houses 2. Maintain power equipment in the nursery. A. Ignition system B. Fuel system C. Cooling system D. Lubrication system E. Air-Intake system	