Tennessee Specific Industry Certification

Horticulture Science Exam Crosswalk

**Directions:** Use this crosswalk tool to aid in the development of a crosswalk between the Tennessee Specific Industry Certification (TSIC) Learning Outcomes and the Horticulture Science Program of Study (POS) course standards. Once you have identified theses crosswalks, use this tool to help plan a program of study pacing guide to ensure all TSIC Learning Objectives are covered with the student as they progress through the Horticulture Science POS.

**Content Area: Business Principles**

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Define financial terms needed to communicate with financial professionals and to make informed business decisions. | 3 |  | 1, 2, 4, 5, 28, and 29 | 6D, 8, and 9 | 21 and 22 |
| 1. Compare and contrast different business models illustrating the advantages and disadvantages of each. |  | 2 | 1, 28, and 29 | 6D | 21 |
| 1. Evaluate income statements and balance sheets to recommend strategic profitability models. | 4 | 2 | 28 and 29 | 6D, 8E, and 9 | 20, 21, and 22 |
| 1. Describe general business and recordkeeping skills necessary to manage a horticultural business, including scheduling, inventory control, merchandise handling and profit and loss statements. | 4 | 2, 3, 21, and 22 | 1, 2, 7, 28, and 29 | 6D, 9 A & E, 10 | 1, 11, 22, and 23 |

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Identify the purpose and parts of a strategic business plan. | 3 and 4 | 2 | 2 | 9 | 21 |
| 1. Summarize the basic management operations of a horticulture nursery. | 3 and 4 | 2, 3, and 19 | 2 and 29 | 9 | 21 |
| 1. Identify effective marketing strategies for a horticulture business. | 3 and 4 | 2, 3, 17, and 19 | 2 | 9 | 21 |
| 1. Develop and evaluate greenhouse production schedules for a representative sampling of greenhouse crops that at a minimum must include: plant selection, plant material cost (seed, plug, and cuttings), growth media, fertilizers, water, testing kits, pricing guides, profit margin, labor, and other expenses. | 16 | 2, 3, 4, 8, 9, 10, 11, 13, 15, 19, and 21 | 29 | 8 |  |
| 1. Using industry-specific terminology explain the process for preparing a price estimate for a landscape design project. |  |  | 2 | 9 | 20, 21, and 22 |
| 1. Understand laws and regulations affecting horticulture businesses. | 3, 4, and 5 | 1, 2, 3, and 13 | 1, 3, 28, and 29 | 4 and 8 | 21, 22, and 23 |
| 1. Describe the economic importance of plants in managed ecosystems and the impact of horticultural crops in food systems. | 3, 4, and 5 | 2 , 3, 16, 17, 18, and 19 | 29 | 8 | 21 and 22 |

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | SDC: Intro. Plant Sci. | | Landscaping and Turf Science |
| 1. Identify and modify the parts of a school-to-career plan in the horticulture industry. | 3 and 4 | | 1 and 2 | 2 and 3 | 4, 9, and 10 | | 1 |
| 1. Identify professionalism standards for employees in the horticulture industry. | 3 and 4 | | 2 | 3 | 4 and 10 | | 1 and 21 |
| 1. Identify how one must prepare for and participate in a job interview in the horticulture industry. | 3 and 4 | | 1 and 2 | 2 | 10 | 2 and 22 | |
| 1. Identify careers related to the operation of a horticultural or landscape business. | 3 | | 2 | 1 and 2 | 9 | 2 and 22 | |

**Content Area: Growing Structures and Environmental Controls**

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Evaluate the factors that influence site selection of a production structure and retail greenhouse. | 7 and 8 | 2, 3, and 6 | 4 | 8 | 18 and 20 |
| 1. Compare the strengths and weaknesses of various growing structures. | 21 | 3 and 6 | 5 | 8 |  |
| 1. Compare the strengths and weaknesses of various environmental control systems used in growing structures. | 21 | 2, 3, 6, 19, and 22 | 5 | 8 | 12 |
| 1. Formulate a list of materials needed to construct an aquaponics and/or a hydroponic growing system. | 21 | 2, 13, 18, 19, 20, 21, 22, and 23 | 6 and 7 | 8 | 15 |
| 1. Critique a design of a commercial layout for a greenhouse system. |  |  | 4, 5, and 6 | 7 and 8 | 16 and 17 |
| 1. Critique a design of a retail garden center layout with parking, greenhouses, office space, etc. |  |  | 6 | 7 and 8 | 20 |
| 1. Identify both employee and customer safety hazards in a retail garden center layout design. | 2 | 1 and 3 | 6 and 24 | 7 and 8 | 2 |
| 1. Explain what type of greenhouse is best suited for an operation, ex: propagation, finished plants grower, annual grower, etc. |  | 18 and 22 | 4, 5, 6, 7, and 27 | 8 |  |

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Compare the different methods of heating a greenhouse space for production and retail, considering cost and availability and suitability. | 21C, D, & E and 23 | 18 and 19 | 4, 6, 7, 19, and 20 | 8 |  |
| 1. Determine the best type of irrigation system for a retail greenhouse vs a production greenhouse. |  | 18, 19, 20, 21, and 22 | 4, 6, 7, and 21 | 7 and 8 | 16 and 17 |
| 1. Compare general maintenance and upkeep requirements for a variety of greenhouses in relation to the type of structure and associated systems. |  | 18 and 19 | 4, 5, 7, 11, 19, 20, and 21 | 7 and 8 | 7, 8, and 9 |
| 1. Develop a checklist of prescribed maintenance, preventative maintenance, monitoring, and troubleshooting schedules for greenhouse facilities and equipment. |  | 18 and 19 | 4, 5, 7, 11, 19, 20, and 21 | 8 | 7, 8, and 9 |
| 1. Determine the mechanical skills needed for the general maintenance and repair of greenhouses and associated systems such as basic wiring, plumbing, and general construction. | 21A & B, 22, and 23 | 18 | 4, 5, 6, 7, 11, 19, 20, and 21 | 8 | 7, 8, and 9 |
| 1. Assess the requirements for producing multiple commercial plant species in a controlled environment. | 17 | 2, 4, 9, 10, 13, 18, and 19 | 19, 20, and 21 | 7 and 8 | 6 |

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Evaluate the greenhouse climate and make recommendations for the proper climate control equipment needed to maintain an optimum growing climate, including but not limited to ventilation, humidifiers, heating, cooling, and shading. | 6, 7, 8, and 23 | 19 and 22 | 4, 19, 20, and 21 | 8 |  |
| 1. Compare and contrast the advantage of automated environmental controls in a greenhouse. | 23 and 24 | 19 and 22 | 4, 19, 20, and 21 | 8 |  |

**Content Area: Plant Genetics and Reproduction**

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | | Landscaping and Turf Science |
| 1. Develop and utilize a vocabulary of appropriate terminology to effectively communicate information related to plant genetics and reproduction. | 9, 10, 11, 17, 18, 19, and 20 | 14. 15, 16, 17, and 18 | 12 and 18 | | 1 and 3 | 4 and 8 |
| 1. Distinguish between simple and complex patterns of inheritance. | 9, 10, and 11 | 15 | 18 | | 3 |  |
| 1. Recognize the differences in DNA structures and their unique characteristics. | 9, 10, and 11 | 15 and 16 | 18 | | 3 |  |
| 1. Outline the processes of DNA replication and gene expression. | 9, 10, and 11 | 14, 15, and 16 | 18 | | 3 |  |
| 1. Compare and contrast DNA and RNA molecules and their functions. | 9 and 10 | 15 | 18 | | 3 |  |
| 1. Describe the primary differences between a monocotyledon and dicotyledon plant and flower including their purpose in plant reproduction. | 10, 12, 18, and 19 | 7, 8, and 14 | 12 and 18 | | 3 |  |
| 1. Explain the complete life cycle from seed to plant to senescence for the different plant types. | 11, 17, and 18 | 8, 14, 15, 17, and 20 | 12 and 18 | | 3 | 8 |
| 1. Calculate the odds of an organism receiving a specific trait through the use of a Punnett Square. | 11 | 15, 16, and 17 | 18 | | 3 |  |

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| Learning Outcome | | Agriscience | | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | | Landscaping and Turf Science |
| 1. Explain the difference between genotypes and phenotypes. | 11 | | 14 and 15 | | 14 | 1 and 3 |  | |
| 1. Summarize the relationship between genetics and the distribution of phenotypes to offspring. | 11 | | 14, 15 and 16 | | 14 | 1 and 3 |  | |
| 1. Summarize the impact of Gregor Mendel’s work on genetics. | 1 and 11 | | 14 and 15 | | 14 | 1 and 3 |  | |
| 1. Explain the importance of genetic engineering. | 1 and 11 | | 14, 1516, 17, and 18 | | 14 | 1 and 3 |  | |
| 1. Compare and contrast the positive and negatives of the development and use of GMO’s. | 1 and 5 | | 2, 3, 14, 15, 16, 17, and 17 | | 1, 12, and 14 |  |  | |
| 1. Identify appropriate propagation methods for plants grown in a commercial greenhouse and nursery operations. | 9,10, 18, and 19 | | 8 and 14 | | 18 | 1 and 3 | 10 | |
| 1. Compare and contrast the following types of plant propagation: cutting, budding, layering, sowing, germination rate calculation, and seed viability. | 11, 18, and 19 | | 7, 8, and 14 | | 18 | 1 and 3 | 10 | |
| 1. Analyze the reproductive structures in plants and describe functions in both sexual and asexual plant reproduction. | 9, 10, 18, and 19 | | 7, 8, and 14 | | 12 and 18 | 1 and 3 | 4 and 10 | |

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| Learning Outcome | | | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | | SDC: Intro. Plant Sci. | | Landscaping and Turf Science |
| 1. Identify the structure and function of different seed components and summarize their roles in plant reproduction and propagation. | | 9, 10, and 19 | | 7, 8, and 14 | | 12 | | 3 | | 7 | |
| 1. Explain the detailed process of the top five most commonly used asexual propagation methods. | 11, 16, 17, and 18 | | | 14, 15, and 16 | | 13 and 18 | | 3 | | 10 | |

**Content Area: Growing Media**

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| Learning Outcome | Agriscience | | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | | Landscaping and Turf Science | |
| 1. Compare the difference between using a soilless and a soil-based production operation. | |  | 4, 5, 6, and 19 | 9 | | 2E | | 11 |
| 1. Explain appropriate fertilizer selection and application methods for growing media. | | 17 | 10 | 17 | | 5E | | 8 |
| 1. Identify the main nutrient components needed by plants and different methods of release in growing media. | | 17 | 9, 10, and 11 | 15 and 17 | | 5B & C | | 8 |
| 1. Explain how the pH of a soil/media impacts nutrient availability. | | 17 | 4, 9, and 11 | 9 | | 5D | | 8 |
| 1. Describe four basic types of growing media used in commercial production of edible and ornamental plants. | |  | 6, 19, and 20 | 10 | | 2E | | 11 |
| 1. Explain the main functions of growing media. | | 17 | 4 and 20 | 8 and 10 | |  | | 11 |
| 1. Compare and contrast the differences in organic vs inorganic growing media. | | 17 | 4 and 20 | 8, 9, and 10 | |  | |  |
| 1. Describe the composition, life cycle, and uses of various composts in growing media. | | 6 and 7 | 4 and 5 | 10 | |  | |  |

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| Learning Outcome | Agriscience | | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | | Landscaping and Turf Science | |
| 1. Explain the correlation of air space and water holding capacity in growing media along with their function. | |  | 4, 5, and 6 | 8 | |  | |  |
| 1. Evaluate a soil sample to determine soil texture from fine to coarse. | | 17 | 4 and 6 | 13 | | 2E | |  |
| 1. Evaluate a soil profile to determine the basic characteristics of each soil type. | |  | 4, 5, and 6 | 13 | | 2E | | 18 |
| 1. Recommend specific plant types that will thrive in each type of soil. | |  | 6 | 29 | |  | | 18 |
| 1. Describe and identify the different ingredients that may be used in a potting media, and what roles each ingredient may play. | |  | 4 | 9 | |  | | 4 and 6 |
| 1. Interpret a soil analysis report for different growing media. | | 17 | 4 | 9 | |  | | 18 |

**Content Area: Landscape Design**

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| Learning Outcome | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | | SDC: Intro. Plant Sci. | | Landscaping and Turf Science | |
| 1. Justify the importance of conducting an initial site analysis for a client. | |  | |  | |  | |  | | 18 |
| 1. Evaluate a site analysis checklist to assess a proposed landscape site. | |  | |  | |  | |  | | 18 |
| 1. Explain what drafting tools and design equipment are necessary to create a basic landscape design. | |  | |  | |  | |  | | 19 |
| 1. Identify landscape design principles and evaluate the components of a comprehensive landscape design plan. | |  | |  | |  | |  | | 20 |
| 1. Develop comprehensive landscape plans using prospective residential and commercial plots and develop a landscape bid package and presentation for each plan. | |  | |  | |  | |  | | 20 |
| 1. Identify appropriate methods of on-site water capturing through the use of water gardening in specific scenarios. | |  | | 6 and 21 | |  | |  | | 15 and 16 |
| 1. Review skills required for careers related to landscape design. | | 3 | |  | |  | |  | | 1 |
| 1. Describe the basic principles of the use of plant materials in a landscape design. | |  | |  | |  | |  | | 3, 5, 6, and 10 |

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| Learning Outcome | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | | SDC: Intro. Plant Sci. | | Landscaping and Turf Science | |
| 1. Differentiate between public and private service areas in a landscape design and illustrate these areas in a drawing. | |  | |  | |  | |  | | 20 |
| 1. Discuss the difference between the terms "softscape" and "hardscape", listing several examples and illustrate these in a drawing. | |  | |  | |  | |  | | 3, 5, and 20 |
| 1. Discuss the principle of "the right plant for the right place" with regards to plant selection, including the use of varieties, cultivars, growing requirements, function and aesthetics. | |  | | 2 | |  | |  | | 5, 6, and 20 |
| 1. Create a base map and assessment of an area for a landscape design. | |  | |  | |  | |  | | 18, 19, and 20 |
| 1. Define xeriscaping and explain how it can be used in a landscape design. | |  | |  | |  | |  | | 14 and 15 |

**Content Area: Plant Anatomy and Physiology**

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| Learning Outcome | | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | | SDC: Intro. Plant Sci. | | Landscaping and Turf Science |
| 1. Explain the role cell structure plays in plant development. | 9, 10, and 16 | | 7 and 8 | |  | | 1A | | 6 | |
| 1. Evaluate plant interactions with an abiotic or biotic environment. | 16 | | 7 and 8 | |  | |  | |  | |
| 1. Compare the various stages of sexual plant reproduction. | 18 and 19 | | 8, 14, and 15 | | 14 | | 3E | |  | |
| 1. Explain the differences between a monocot and dicot plant with regards to embryo development, flower parts, leaf venation, vascular bundles, and secondary growth. | 18 and 19 | | 8 and 14 | |  | | 1B | | 5 | |
| 1. Draw a leaf cross section, labeling the major cell types and describing their functions. | 9, 10, 18, and 19 | | 7, 8, and 14 | | 12 | | 1A & B | |  | |
| 1. Draw and label the parts of a perfect flower containing both non-reproductive and reproductive structures. | 18 | | 8 and 14 | | 12 | | 1B | | 10 | |
| 1. Describe and illustrate the external parts of a leaf, various leaf types and leaf arrangements. | 18 | | 8 | | 12 | | 1B & C | | 3, 5, 7, and 10 | |

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| Learning Outcome | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | | SDC: Intro. Plant Sci. | | | Landscaping and Turf Science |
| 1. Define and describe the function of outer bark, inner bark, cambium, sapwood and heartwood and their physical relationship in a woody plant. | | 18 | | 7 and 8 | | 12 | 1B & C | | 3 and 4 | |
| 1. Describe and explain the function of the parts of trees and shrubs. | | 18 | | 7 and 8 | | 12 | 1C | 3 and 4 | | |

**Content Area: Plant Disorders, Diseases, and Pest Management**

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Explain the known historical effects of pesticide on the environment and human health. | 1 and 8 | 3, 12, and 13 | 23 and 24 | 4A | 2 and 13 |
| 1. Evaluate the significance of and define Integrated Pest Management (IPM). | 2 and 3 | 12 and 13 | 25 | 4B | 12 |
| 1. Identify common weeds, insects, mites, and plant diseases of commercially grown plants. |  | 12 and 13 | 22 | 4B | 12 |
| 1. Review and assess a pest control management schedule for a major crop. | 2 | 12 and 13 | 23 and 25 |  | 12 and 13 |
| 1. Describe plant diseases and vectors and their means of dispersal. |  | 12 and 13 | 22 and 25 | 4C, D, E, & F | 12 and 13 |
| 1. Explain the difference between ‘symptoms’ and ‘signs’ of plant diseases and give examples from biotic and abiotic causes. |  | 12 and 13 | 22 | 4C & F | 12 |
| 1. Identify common lawn weeds and indicate which are annuals or perennials, season of germination, and means of reproduction. |  | 1, 12, and 13 |  |  | 2, 7, 8, 12, and 13 |

**Content Area: Plant Nutrition**

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| Learning Outcome | | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Identify the essential nutrients needed for plant growth including major and minor nutrients. | 16 and 17 | | 9 | | 15 | | 5B & C | 4, 6, and 8 |
| 1. Explain how nutrients become available for plants. | 16 and 17 | | 9 and 11 | | 9 and 15 | | 5A, C, & D | 8 |
| 1. Interpret a fertilization formulation and identify different methods of fertilizer application. | 17 | | 10 | | 17 | | 5E | 8 |
| 1. Identify common signs of nutrient deficiencies in plants. | 16 and 17 | | 9 and 11 | | 15 | |  | 4, 6, and 8 |
| 1. Describe the role of soil pH on nutrient availability and overall plant health. | 16 and 17 | | 4, 5, 6, 7, and 11 | | 9 | |  | 4, 6, and 8 |
| 1. Evaluate a basic soil analysis to determine the chemical element and nutritional levels available in soils essential for plant growth. | 16 and 17 | | 4, 9, and 10 | | 9 | |  | 4, 6, and 8 |
| 1. Analyze the nutrient requirements of plants and assess the importance of essential plant nutrients to plant growth and development. | 16 and 17 | | 9 and 11 | | 15 | | 5B & C | 4, 6, and 8 |
| 1. Illustrate the process of photosynthesis. | 16 | | 8 and 9 | | 13 | | 1A & B |  |
| 1. Compare and contrast water soluble, granular, and organic fertilizers. | 17 | | 10 | | 17 | | 5E | 4, 6, and 8 |

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Synthesize information on a fertilizer label and be able to estimate usage. | 17 | 10 and 22 | 17 | 5E | 4, 6, and 8 |
| 1. Summarize the requirements for nutrients and pH for turf grasses. | 16 and 17 | 9 and 10 | 15 |  | 4, 6, and 8 |
| 1. Analyze the fertilizer needs, if any, of established trees and shrubs. | 17 | 9 and 10 |  |  | 4, 6, and 8 |

**Content Area: Plant Selection and Maintenance**

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| Learning Outcome | | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Identify and recommend common vegetable, fruit, forage, field, and landscape (ornamental and turf) crops. |  | | 2 | | 11 | | 6A & D | 5, 6, AND 7 |
| 1. Recommend growing schedules for commonly used vegetable, fruit, forage, field, landscape, and turf crops. |  | | 2, 4, 8, 9, 10, 11, and 12 | | 19 | | 6C | 7, 8, and 9 |
| 1. Develop a basic lawn, shrub and tree maintenance program including weed control, mowing, pruning, fertilizing, and pest management. | 17 | | 4, 8, 9, 10, 11, 12, and 13 | |  | |  | 3 ,4, 5, 6, 7, 8, and 9 |
| 1. Recommend appropriate, effective and integrated approaches to produce and maintain high-quality food and ornamental crops. | 17 | | 10, 12, and 13 | | 21 | |  | 10 and 11 |
| 1. Differentiate function, form, and growth requirements for common perennials, annuals, and biennials. | 17 | | 5, 8, 9, 10, 11, 12, and 13 | | 13 | |  | 4, 6, 8, and 9 |
| 1. Assess methods for general care and maintenance of ground covers, vines, and plants including planting, pruning, mulching, and fertilizing techniques. | 17 | | 8, 9, 10, 11, and 12 | | 19 | |  | 6 |

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| Learning Outcome | | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Recommend and justify specific vines and groundcovers to solve special landscaping issues. |  | |  | | |  | 7C | 6 |
| 1. Identify and distinguish between common tree and shrub species used for landscaping and describe research based practices in harvesting, transportation, transplanting and care. |  | |  | |  | |  | 3 |
| 1. Justify by drawing on research and technical data, the importance of the site evaluation, preparation, and consideration of hardiness zones in the selection of trees and shrubs. | 17 | | 4 and 6 | |  | | 7C | 4 |
| 1. Classify ornamentals, shrubs, and trees by their growth habit. |  | | 3 | |  | | 12 | 3 |
| 1. Identify and classify basic ornamental flowers and plants used for the commercial interior plant scape, and summarize their installation techniques, and maintenance requirements. |  | |  | | 19 | |  | 10 |

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| Learning Outcome | | Agriscience | | | Principles of Plant Sci. & Hydroculture | | | Greenhouse Management | | SDC: Intro. Plant Sci. | | Landscaping and Turf Science |
| 1. Demonstrate the ability to construct an interior display using a variety of plant materials, including but not limited to foliage, flowering plants, (both cut and potted), live, and permanent/silk plants. | | |  | | |  | | |  | |  | 10 and 11 |
| 1. Identify and compare/contrast the functions and components of turfgrass species to determine appropriate recommendations. | | |  | | |  | | |  | |  | 7 |
| 1. Describe establishment and maintenance methods of turf grasses, including soil preparation, installation, watering/fertilizer application, and nutrient/pH calculations and adjustments. | 17 | | | 4, 6, 9, 10, 11, and 12 | | |  | | |  | | 8 |
| 1. Evaluate and compare the different management requirements of residential, commercial, and sports turf. | 17 | | | 9, 10, 11, 12, and 13 | | |  | | |  | | 9 |
| 1. Identify management practices and associated equipment requirements for mowing, irrigation, and weed, disease, and fungus control for common turf grass species. |  | | | 12 and 13 | | |  | | |  | | 9 |

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| Learning Outcome | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | | SDC: Intro. Plant Sci. | | Landscaping and Turf Science | |
| 1. Understand the importance of binomial nomenclature and its use. | |  | | 3 and 8 | | 11 | |  | | 3, 5, and 7 |
| 1. Explain the anatomical and physiological differences between plant species. | | 18 and 19 | | 3 and 8 | | 12B | |  | | 3, 5, and 7 |
| 1. Understand light requirements for specific horticultural crops as it relates to plant selection and maintenance. | | 16D | | 8 and 9 | | 12 | |  | |  |
| 1. Differentiate growth requirements for common perennials, annuals, and biennials as it relates to plant selection and maintenance. | | 17 | | 8, 9, 10, 11, 12, 21, and 22 | | 11, 12, 13, and 14 | |  | | 3, 5, and 7 |

**Content Area: Safety**

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | | Landscaping and Turf Science | |
| 1. Articulate processes that must be taken to keep employees safe in a horticulture business. | 2 | 1and 13 | 3, 16, and 24 | | 4 | | 2 |
| 1. Explain the importance of keeping records as it relates to safety. | 2 | 1and 13 | 3 | | 4 | | 2 |
| 1. Describe the current top five citations from OSHA each year and explain how a citation could have been prevented. | 2 and 5 | 1and 13 | 3 | | 4 | | 2 |
| 1. Identify components of the Food Safety Modernization Act (FSMA) including potential FSMA violations in a familiar horticulture enterprise. | 2 and 5 | 1 | 3 | | 4 | | 2 |
| 1. List potentially hazardous materials utilized in various horticulture enterprises. | 2 | 1 and 13 | 3 and 16 | | 4 | | 2 |
| 1. Demonstrate the proper procedures to take when encountering hazardous materials. | 2 | 1 and 13 | 3 and 16 | | 4 | | 2 |
| 1. Discuss the requirements of the Agricultural Worker Protection Standard. | 2 and 5 | 1 and 13 | 3 | | 4 | | 2 |
| 1. Interpret a pesticide product label correctly. | 2 | 1 and 13 | 2, 4, 23, and 24 | | 4 and 9 | |  |
| 1. Discuss pesticide safety and the use of Personal Protective Clothing (PPC) and Personal Protective Equipment (PPE) when mixing and spraying pesticides. | 2 and 5 | 1 and 13 | 3, 17, and 24 | | 4 | | 12 and 13 |

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | | Landscaping and Turf Science | |
| 1. Identify four ways that pesticides can enter the body and list common signs and symptoms of pesticide poisoning. | 1and 2 | 1, 12, and 13 | 3, 23, and 24 | | 4 | | 12 and 13 |
| 1. Describe the safety rules to observe when transporting pesticides in a car or truck and the safety rules to follow when storing pesticides. | 2 | 1, 12, and 13 | 3, 23, and 24 | | 4 | | 12 and 13 |
| 1. List the three “Cs” of pesticide spill management and explain the actions to take under each category. | 1 and 2 | 1, 12, and 13 | 3, 23, and 24 | | 4 | | 12 and 13 |
| 1. Explain where to find directions on safe disposal of leftover pesticides and what to do with leftover pesticides | 1, 2, and 3 | 1, 12, and 13 | 3, 23, and 24 | | 4 | | 12 and 13 |

**Content Area: Plant and Soil Science**

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| Learning Outcome | | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Explain how soil fertility is determined and how plant nutrient deficiencies are identified. | 9, 10, 16, and 17 | | 1, 4, 6, 9, and 11 | | 15 and 27 | |  |  |
| 1. Describe potential ways to improve soil fertility. |  | | 5, 6, and 10 | | 14, 15, 17, and 27 | |  |  |
| 1. Determine soil health based on descriptions provided in scenarios. | 17 | | 5 and 6 | | 9 | | 2 |  |
| 1. Apply diagnostic skills for addressing soil constraints, irrigation, nutrients, and stress issues. | 17 | | 5, 6, 9, and 11 | | 15, 21, and 27 | | 5 |  |
| 1. Identify and describe the characteristics of the major soil types. |  | | 4, 5, and 6 | | 8 and 9 | | 2 |  |
| 1. Explain the process of capillary action in soil. |  | | 4 | | 8 and 9 | |  |  |
| 1. Draw a soil profile and describe in detail the significance of each layer. |  | | 4 | | 9 | | 2 |  |
| 1. Describe in detail what is meant by soil judging, what aspects are determined through soil judging and methods used to measure these aspects. |  | | 4 | |  | | 2 |  |
| 1. Create a remediation plan for a plot of land that has been depleted. |  | | 6 | |  | |  |  |

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| Learning Outcome | | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science |
| 1. Describe the correlation of the Munsell color chart as it relates to its organic and mineral content of soil. |  | | 4 and 6 | |  | |  |  |

**Content Area: Water Management**

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| Learning Outcome | Agriscience | | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | | SDC: Intro. Plant Sci. | | Landscaping and Turf Science | |
| 1. Apply maintenance strategies to maintain a healthy water garden or pond, addressing at minimum the following considerations: pH, nitrate, dissolved oxygen, algae, pollutants, filter requirements, and fish feed schedules. | | 6 and 8 | | 2, 3, 5, 6, 18, 19, 20, 21, 22, and 23 | | 26 and 27 | |  | | 14 and 15 |
| 1. Compare and contrast different irrigation systems and summarize their advantages and disadvantages. | |  | | 19 | | 4, 6, and 7 | | 7D and 8 | | 16 |
| 1. Identify irrigation tools and system components and their function and/or application. | |  | |  | | 4, 6, and 7 | | 8 | | 17 |
| 1. Calculate the water supply flow rate, head pressure requirements, and pipe and pump size considerations for a water garden, pool, pond or irrigation system. | |  | | 18, 19, and 21 | | 4, 6, and 7 | | 8 | | 16 |
| 1. Identify the plumbing skills required to install irrigation and water features in a landscape or turf setting. | |  | | 18 | | 6 and 7 | | 8 | | 16 and 17 |

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| Learning Outcome | Agriscience | Principles of Plant Sci. & Hydroculture | | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science | |
| 1. Discuss the design requirements for an irrigation system for a residential landscape and develop a bid presentation that identifies the project timeline, required permits, and costs of installation and selected materials. |  | |  | 4, 6, and 7 | 8 | | 16 and 17 |
| 1. Distinguish between runoff and erosion. | 8 | | 5 and 6 |  |  | |  |
| 1. Explain the importance of a riparian zone and its significance to the environment. | 8 | 5 and 6 | |  |  |  | |
| 1. Discuss the correct procedure for collecting water samples from different surface water sources, such as pond, river, etc., and city water sources. |  | 5, 20, 21, and 22 | |  |  | 15 and 16 | |
| 1. Evaluate pH of water samples with a pH meter or litmus paper, compare how pH changes with introduction of a base or acid and describe the difference. |  | 21and 22 | | 9, 26, and 27 |  | 15 | |
| 1. Explain how water samples for salt and nutrient content are taken and analyzed. |  | 21and 22 | | 9, 26, and 27 |  | 15 | |
| 1. Justify the most effective type of irrigation system for specific crops on sites based on available water resources. |  |  | | 9, 26, and 27 | 7D | 16 | |

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| Learning Outcome | | Agriscience | Principles of Plant Sci. & Hydroculture | Greenhouse Management | SDC: Intro. Plant Sci. | Landscaping and Turf Science | |
| 1. Diagram an irrigation system using appropriate sized pump, pipe, and delivery system to fit the needs of a simulated horticultural crop. | |  |  | 9, 26, and 27 |  | 14 and 17 | |
| 1. Demonstrate an understanding of the key components of a water management system. | |  | 22 | 9, 26, and 27 |  | 15 | |
| 1. List the key factors that indicate water quality and ways to manipulate each factor. | | 6 | 21and 22 | 9, 26, and 27 |  | 15 | |
| 1. Explain the impact of different types of pumps, flow rates of pipe sizes ½” to 10” in gallons per minute, friction loss, and the correlation between pressure and volume when calculating GPM. |  | | 19 | 26 and 27 |  | | 14 and 17 |
| 1. Given specific parameters, calculate the flow and pressure requirements of a landscape irrigation system. |  | |  |  |  | | 14 and 17 |
| 1. Describe basic management operations of a hydroponic system. |  | | 18, 19,20, 21, 22, and 23 | 26 and 27 |  | | 15 |