This document, which lists the horticultural-agricultural technologies competencies identified by representatives from business, industry, and labor as well as educators throughout Ohio, is intended to assist individuals and organizations in developing college tech prep programs that will prepare students from secondary through post-secondary associate degree programs for employment as Landscape Designer/Manager Landscape Technicians; Golf Course Maintenance Technicians; Lawn Care Specialist/Technicians; Tree Maintenance Technician/Arborists; Nursery Technicians; Floral Designers; Agricultural Custom Applicators; Agricultural Crop Consultants; and Greenhouse Technician/Managers. The competencies, which are separated into essential competencies needed to ensure a minimal level of employability and recommended competencies, are organized by instructional units and include suggestions as to when students should be introduced to, reinforced, and proficient at them. The included Technical Competency Profile (TCP) matrix includes a list of 29 technical competencies that are required or recommended for the different types of employment listed above. Some of the common competencies are as follows: plant science; workplace safety; basic accounting; daily management tasks; supervision; sales and marketing; horticulture fundamentals; horticultural plant health care; equipment maintenance; soil science and management; and environmental science and ethics. Includes a list of TCP panel members. (MO)
Horticulture-Agriculture Technologies

State Competency Profile

December 7, 1998
Columbus, Ohio
Horticulture/Agriculture Technologies
State Competency Profile Meeting
December 7, 1998

Educator Panel

Glenn Abke, Professor, Agri-Business
Owens Community College
Toledo, Ohio

John Allen, Instructor, Horticulture
Jackson High School
Massillon, Ohio

Christi Bachman, Instructor, Agriculture Education
Liberty Union High School
Baltimore, Ohio

Bob Boufford, Associate Professor
Clark State Community College
Springfield, Ohio

Chris Carlson, Director/Professor, Horticulture
Kent State University – Salem Campus
Salem, Ohio

Steve Cooper, Instructor, Agriculture Education
Mechanicsburg High School
Mechanicsburg, Ohio

Sharon Davis, Floral Design/Greenhouse Maintenance Instructor, Agriculture Education
Buckeye Career Center
New Philadelphia, Ohio

Susan Everett, Associate Professor, Agribusiness
Clark State Community College
Springfield, Ohio

Chris Foley, Assistant Professor, Agri-Business
Owens Community College
Toledo, Ohio

Tom Franek, Horticulture Instructor, Urban Forestry
Kent Roosevelt High School
Kent, Ohio

Mike Fulton, Associate Professor, Horticulture
Ohio State ATI
Wooster, Ohio

Dave Goerig, Instructor, Horticulture
Columbiana County Career Center
Lisbon, Ohio

Tom Green, Agriculture Instructor, Horticulture
Marlington High School
Alliance, Ohio

Waid Lyons, Instructor, Agriculture
Miami Valley Career Tech. Center
Clayton, Ohio

Kevin McCann, Landscape Teacher, Horticulture
Toledo Agriculture Education Center
Toledo, Ohio

Dave Munn, Associate Professor, Ag. Ind. Division
Ohio State ATI
Wooster, Ohio

Steven O'Neal, Professor, Landscape Design/Build
Columbus State Community College
Columbus, Ohio

Maurice Peoples, Technician, Horticulture
Kent State University – Salem Campus
Salem, Ohio
Dave Richards, Instructor, Horticulture
Auburn Career Center
Concord Twp, Ohio

Dan Rueger, Teacher, Horticulture
Ashland High School
Ashland, Ohio

Jeff Shoup, Agriculture Supervisor
Miami Valley Career Tech. Center
Clayton, Ohio

Dave Sproull, Landscape Instructor, Horticulture
Greene County Career Center
Xenia, Ohio

Tim Turner, Instructor, Agriculture Education
Liberty Union High School
Baltimore, Ohio

Sam Woods, Agriculture Technology
Ohio State ATI
Wooster, Ohio

Debbie Woodworth, Instructor, Horticulture
Mentor Public Schools
Mentor, Ohio
Horticulture/Agriculture Technologies
State Competency Profile Meeting
December 7, 1998

Business, Industry, Labor Panel

Jim Archer, Branch Manager, Crop Adv., Custom Applicator
Clark Landmark, Inc
Medway, Ohio

Richard Baker, Florist, Design Greenhouse
Baker Florist
Dover, Ohio

Jon Berry, Manager, Sales
Terra Industries
Mechanicsburg, Ohio

Matt Burden, Manager, Landscape Services
Turf Doctor Corp.
Mt Vernon, Ohio

Todd Dallas, Manager, Ag. Business
IMC AgriBusiness
West Liberty, Ohio

Ron W Denniston, Manager, Sales
IMC AgriBusiness, Inc
Troy, Ohio

John Hildebrand, Custom Applicator, Ag. Business
IMC AgriBusiness
Urbana, Ohio

Tim Hoffman, Pesticide Control Supervisor, Ohio Dept of Agriculture
Pesticide Regulations
Reynoldsburg, Ohio

Tim Jackson, National Recruiter, Residential
Davey Tree Expert Co
Kent, Ohio

Richard Jones, Manager, Education & Training
Davey Tree Expert Co
Kent, Ohio

Lola Lewis, Urban Forester, Division of Forestry
ODNR
New Philadelphia, Ohio

Tom Roig, Owner, Landscape Contractor
T & B Landscapes
Shreve, Ohio

Doug Schira, Assistant Superintendent, Greens & Grounds
Wooster Country Club
Wooster, Ohio

Gary Stanko, Service Representative, Nursery/Landscape
Barnes Nursery Inc.
Huron, Ohio

Dan Stollard, Owner/Manager, Nursery
Stollard Farms
Montville, Ohio

Greg Supers, Jr, Owner, Landscape
Supers Landscape
Oberlin, Ohio

John W Woodall, President
Woodall Tree Preservation
Vienna, Ohio
Horticulture/Agriculture Greenhouse Technologies
State Competency Profile Meeting
June 29, 1999

BUSINESS/INDUSTRY/LABOR REPRESENTATIVES

Jackie Gingery
Plant Patch
Wooster, Ohio

Susie Shreve
Shreve Greenhouse
Perry, Ohio

Tom Machamer
Cedar Lane Farms
Wooster, Ohio

Jackie Vlasak
Vlasak's Greenhouse
Cutler, Ohio

Dick Shreve
Shreve Greenhouse
Perry, Ohio

EDUCATOR REPRESENTATIVES

Sharon Davis
Buckeye Career Center
New Philadelphia, Ohio

Dave Richards
Auburn Career Center
Concord Twp., Ohio

Jeff Johnson
Wayne County Schools Career Center
Smithville, Ohio

Tim Simpson
Meigs Local School District
Pomeroy, Ohio

Dr. Robert McMahon
Ohio State ATI
Wooster, Ohio

Richard Webb
Tri-County JVS
Nelsonville, Ohio
OCCUPATIONAL DEFINITIONS

Horticulture-Agriculture Technologies

Landscape Designer/Manager – Landscape Technician
An individual who applies horticultural engineering and architectural principles to develop residential, commercial, and/or recreational environments which are both functional and beautiful and seeks Pesticide Applicator Certification. Technical skills should include, but not be limited to:

- plant identification, selection, and culture
- drafting
- equipment maintenance and operation
- landscape contracting
- landscape construction
- landscape design
- precision agriculture
- safety regulations
- application of pesticides and fertilizers
- customer sales and services
- computer skills
- supervision
- record keeping and laws
- basic soil and plant science
- pest identification and management

Golf Course Maintenance Technician
An individual who applies horticultural principles and business skills in managing a golf course. Technical skills should include, but not be limited to:

- turf selection and management
- irrigation and drainage
- care of trees, shrubs and flowers
- operation of equipment
- repair of equipment
- golf course organization/set-up
- design concepts and renovation
- golf course maintenance
- business management.
Lawn Care Specialist/Technician
An individual who applies horticultural principles and business skills to install, manage, and maintain lawns, athletic fields, or other turf areas. Technical skills should include, but not be limited to:

- grass/cultivar selection
- turf identification
- installation of turf areas
- maintenance of turf areas
- fertilization of turf areas
- irrigation and drainage
- aeration methods
- equipment operation and maintenance
- knowledge of environmental impact of lawn pesticides and fertilizers
- precision agriculture
- safety regulations
- application of pesticides and fertilizers
- customer sales and services
- computer skills
- supervision
- record keeping and laws
- basic soil and plant science
- pest identification and management
Tree Maintenance Technician/Arborist
An individual who applies horticultural principles and business skills to residential, commercial, governmental, and utility tree care. Technical skills should include, but not be limited to:
- tree selection
- transplanting trees
- pruning trees
- fertilizing trees
- tree removal
- lightning protection
- cabling and bracing of trees
- operation and maintenance of equipment
- identification of plant
- precision agriculture
- safety regulations
- application of pesticides and fertilizers
- customer sales and services
- computer skills
- supervision
- record keeping and laws
- basic soil and plant science
- pest identification and management

Nursery Technician
An individual who applies horticultural principles and business skills in nurseries, garden centers, arboretums, and botanical gardens and seeks to be a Certified Nursery Technician. Technical skills should include, but not be limited to:
- identification of plants
- plant production
- propagation
- plant culture
- equipment operation and maintenance
- soil sampling and analysis
- drainage and irrigation
- pruning
- inventory control
- safe chemical handling
- precision agriculture
- safety regulations
– application of pesticides and fertilizers
– customer sales and services
– computer skills
– supervision
– record keeping and laws
– basic soil and plant science
– pest identification and management

**Floral Designer**
An individual who applies horticultural and artistic principles with business skills to design fresh and artificial arrangements. Technical skills should include, but not be limited to:
– identification of flowers and their care requirements
– handling of flowers and greens
– handling and use of pot plants
– floral arrangements
– decorative use of foliage
– management
– design
– safety regulations
– safety regulations
– customer sales and services
– computer skills
– supervision
– record keeping and laws

**Agricultural Custom Applicator**
An individual who applies knowledge of agricultural principles of fertilization and pesticides to aid in the production of crops and seeks to be a Certified Crop Advisor (CCA). Technical skills should include, but not be limited:
– soil sampling
– identification of plant nutrient needs
– fertilization of crops
– equipment maintenance and operation
– knowledge of environmental impact of application of agricultural pesticides and fertilizers
– emergency first aid
– precision agriculture
Agricultural Crop Consultant
An individual who applies agricultural principles to aid farmers and other production agriculturalists and seeks to be a Certified Crop Advisor (CCA). Technical skills should include, but not be limited to:
- field evaluation
- knowledge of crop management
- crop selection
- soil sampling and analysis
- soil management and conservation
- crop inspection
- fertilization of crops
- marketing and sales
- knowledge of environmental impact of agricultural practices
- application of agricultural chemicals
- safe chemical handling
- precision agriculture
- safety regulations
- application of pesticides and fertilizers
- customer sales and services
- computer skills
- supervision
- record keeping and laws
- basic soil and plant science
- pest identification and management
Greenhouse Technician/Manager
An individual who applies horticultural and business principles in all areas of greenhouse production, as well as in sales, service, and consulting. Technical skills should include, but not be limited to:

- identification of plants
- plant production
- plant propagation
- fertilization
- pruning
- pest and pathogen management
- greenhouse environmental control
- harvesting, handling and use of pot plants, bedding plants, foliage, cut flowers, vegetables, hanging baskets, and perennials
- greenhouse equipment maintenance
- marketing and sales
- greenhouse construction
- communication skills
LEVELING CODES

GRADE LEVEL
12 = by the end of grade 12
AD = by the end of the Associate Degree

DEPTH
I = Introduce (applies to at least three or 25% of the competency builders)
R = Reinforce or add depth (after introducing or proficiency)
P = Proficient (achievement of the competency without supervision)

OTHER (Determined by Business, Industry and Labor Panel)
Essential Competency: Competency is needed to ensure minimal level of employability. Entry level employees should be able to perform this competency without supervision. Competencies required for certification, licensure, and/or national skills standards should be tagged as essential.
Recommended Competency: Competency should be included but is not essential for minimal level of employability.
Delete: Competency should not be included.

Example:
BIL: Essential Recommended Delete
EDU 12 AD AC
      P R
Competency: XXXXXXX

Example:
BIL: Essential Recommended Delete
EDU 12 AD AC
      P R
Competency: YYYYYYY
Competency Builders:
  SSS
  XXX
## Horticulture-Agriculture Technologies
### Tech Prep Competency Profile

### Matrix

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1 X = Unit required
2 R = Recommended only
3 O = Some competencies, not applicable
Unit: Plant Science

BIL: Essential

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Competency: Demonstrate general knowledge of plant anatomy

Competency Builders:
List the parts of the plant and their functions including: seed (embryo, cotyledon, coat), root, modified stems (tuber, rhizome, stolon, corm, bulb) stem (xylem, phloem, pith, cambium), leaf (blade, lobe, auricle, ligule), meristem (apical, dominant, terminal, auxiliary bud), and flowers (petals, corolla, sepals, calyx, bracts, anther, stamen, style, ovary)
Identify the major components of cells
Identify different types of root cells, where they are found in the root and what function they serve
Identify different types of stem cells, where they are found in the stem and what function they serve
Identify different types of leaf cells, where they are found in the leaf and what function they serve
Identify differences between meristematic tissue and differentiated tissue
Explain the function of the major tissue systems and how they are arranged in plant organs
Competency: Identify different types of sexual and asexual reproduction

Competency Builders:
Identify the male and female flower parts as well as non-sexual flower parts and their modifications
Identify the parts of a seed
Identify the environmental influences on seeds that are critical for germination
Explain the pollination process and factors that contribute to success
Analyze germination results from seeds using different seeds and media
Identify advantages of utilizing hybrid seeds
Identify factors that affect germination percentage
Explain the differences between the basic process of asexual growth and sexual cell development
Explain the process of propagating plant material by crown division; layering; and rhizomes and stolons
BIL: Recommended

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Competency: Identify genetic principles and terminology

Competency Builders:
- Identify major steps or phases of mitosis
- Identify major steps or phases of meiosis
- Explain the similarities and differences between mitosis and meiosis
- Explain dominant and recessive gene characteristics
- Explain homozygous and heterozygous gene characteristics
- Identify difference between genotype and phenotype
- Describe the possible impact of genetic engineering on plant improvement
- Describe possible applications of genetic engineering and gene splicing on pest control
BIL: Essential

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Competency: Classify plants

**Competency Builders:**
Describe the functions of plants (e.g., food, feed, fiber, soil, wood, recreation, erosion control, nutrient recycling, medicinal, industrial-dyes, chemicals)
Describe the basis for plant classification
Identify the components of the binomial system of nomenclature
Identify the life cycle conditions necessary to classify a plant as an annual, a biennial, or a perennial
Classify living plant seeds or reproductive structures according to life cycle
Identify basic plant biological classification units (i.e., family, order, class, division, genus, species)
BIL: Essential

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Competency: Explain plant metabolism and physiology

Competency Builders:
Identify components of photosynthesis processes in plants
Identify plant pigments
Explain the importance of plant pigments to photosynthesis
Identify different color patterns found in plant leaves
Describe the effect of different color patterns found in plant leaves on photosynthesis
Outline the respiratory process
Explain the inter-relationship between the respiratory process and photosynthesis and plant growth
Contrast transpiration and evaporation
Explain the use of water within the plant
BIL: Essential

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Competency: Demonstrate knowledge of plant growth and development

Competency Builders:
List micro or macro nutrients
Classify micro or macro nutrients
Describe the process of water uptake and use in plants
Explain the effects of light intensity, quality and duration on plant growth
Explain the concept of plant hardiness and the classification based upon minimum temperature tolerance
Explain the effect of temperature on growth rate, life cycle, seed viability, and germination as well as plant reproduction
Identify major classes of chemical/hormonal growth regulators and their functions
Competency:  Explain plant nutrition and fertilization

Competency builders:
Define available nutrients, leaching, element, organic fertilizer and inorganic fertilizer
Identify the primary elements and their functions in plant growth
Identify deficiencies caused by the lack of the minor elements
Differentiate between organic and inorganic fertilizers
Describe the advantages and disadvantages of organic versus inorganic fertilizers
Describe the hazards associated with over fertilization
Competency: Identify environmental factors affecting plants

Competency Builders:
Describe external influences on plant growth
Explain photoperiodism and dormancy in plants
Describe affects of plant hormones
Explain the commercial uses of auxins
List optimum growth conditions for different types of plants
Describe the influence of day length on plant growth
Explain how the cycle of the seasons influences plant growth
Competency: Explain how to improve plant seed quality

Competency Builders:
Define heredity, genetics, inbreeding, crossing, progeny, self-fertilization, cross fertilization, mutation, hybrid, systemic pesticide, toxic, and vigor
Explain seed development, morphology, and composition
List the characteristics of good seeds
Describe the factors which create poor seed quality
Describe the history of plant improvement
List major aims of plant breeders
Describe three methods of plant improvement
Identify state agency responsible for seed certification
Describe major points and economic aspects to consider when identifying varieties for planting
Explain the danger of monogenetic type crops (e.g., southern corn blight)
Describe the possible impact of genetic engineering
Describe breeding for pest resistance (e.g., insects, nematodes, and diseases)
Describe the classes of seeds (e.g., breeders, registered, certified)
Differentiate between hybrid seed and seeds from open pollinated or self-fed plants
Explain how “hard seeds coat” can be used to maintain high quality seed
Explain why plant breeding take several years
Explain why breeders have to constantly be developing improved varieties
Competency: Describe plant diseases

Competency Builders:
Define microorganism, pathogens, symptoms, day length, wilt, mosaic, blight, curl, dwarfing, gall, mildew, rot, smut, and disease
Identify major causes of plant disease
Describe the symptoms and effects of major diseases on major agricultural/horticultural crops
Identify several methods by which diseases are transmitted in plants
Explain Koch’s Postulates and their use in determining primary and secondary pathogens
Explain how fungi attack plants
Describe the typical structure and function of fungi
Describe the life cycle of wheat rust and potato blight
Differentiate between a saprophyte and a parasite
Explain how some fungi are helpful to plants
Explain how fungi are classified
Explain how bacteria are classified
Explain that bacteria affect their host using exotoxins or endotoxins
Explain that the ability of bacteria to reproduce by fission makes them dangerous
Explain how viruses are noncellular pathogens that use the cell’s DNA or RNA to reproduce
Explain how viruses are classified by their host
Describe the lytic cycle of a virus
Identify environmental conditions that favor or hinder disease development
Competency: Explain management of plant diseases

Competency Builders:
Define damping off, fumigant, fungicide, resistance, sprays, dust, volatile, crop rotation and sanitation
Explain the “disease triangle”
Describe cultural practices that may be used to prevent plant diseases
Describe the impact of genetic engineering on control of plant diseases
Explain how chemicals manage diseases
Explain how genetic resistance reduces production costs and potential environmental impact from spraying
Explain the economic importance of managing plant diseases
BIL: Essential

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Competency: Explain weed management

Competency Builders:
List ways weeds spread
List reasons weeds are harmful
List methods of weed management
Explain mode of action of common herbicides
Explain weed resistance to herbicides
Describe possible applications of genetic engineering and gene splicing to weed control
Explain how herbicides kill weeds
Identify the major weed species and explain options available for managing each
BIL: Essential

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Competency: Explain moisture control

Competency Builders:
Define irrigation, mulch, organic matter, runoff, seepage, subsoiling, and tillage
List three methods of moisture control
List the cultural practices used in moisture control (i.e., annually and at planting)
Describe importance of internal and external drainage in soils
Describe importance of irrigation to plants
Describe the methods of irrigation (e.g., drip, furrow, sprinkler, flood)
Explain the hydrologic cycle
Explain how irrigation causes salinity problems
Explain salt water intrusion in irrigation wells
Explain subsidence caused by removal of irrigation water
Describe methods used to reduce irrigation water loss
Explain the use of tensiometers and moisture meters
Explain irrigation scheduling
Unit: Workplace Safety

BIL: Essential

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Competency: Demonstrate safe work habits

Competency Builders:
Wear protective clothing and equipment, including eye and ear protection as required
Interpret information on signs and labels
Explain why safety equipment and personal protective equipment are necessary, including cost and consequences
Check working condition of safety equipment and personal protective equipment (e.g., physically, listening)
Report malfunctioning safety equipment and personal protective equipment
Observe safety precautions when handling chemicals or fertilizers
Follow personal cleanup procedures after handling chemicals and fertilizer
Interpret hazardous materials notices
Recognize the existence of hazardous materials, their use and disposal procedures according to government regulations (e.g., fertilizers, mulch, gasoline)
Explain why wastewater must be disposed of safely
Identify safety problems within work environment (e.g., loose wiring, broken concrete, slippery surfaces)
Pay attention to safety as you work (i.e., don't create safety problems that are not there)
Explain why safety problems and corrective measures are important (e.g., focus on loss of time, money, energy)
Differentiate safety as it relates to customer vs. employees
BIL: Essential

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Competency: Maintain safe work environment

Competency Builders:
Maintain clean and safe work area
Identify hazards presented by hazardous materials
Identify hazardous materials and location of Material Safety Data Sheets (MSDS), including comparative hazards
Follow MSDS safety information and "Right-to-Know" legislation
Comply with shop and equipment safety rules
Follow environmental and safety issues pertaining to the Environmental Protection Agency (EPA), Food and Drug Administration, OSHA, and/or other state and federal regulations
Report safety hazards and accidents to supervisor immediately
Complete detailed accident report and explain the consequences
Identify why safety devices are important, and the consequences of their absence
Maintain safety devices
Comply with general - use and restricted - use product regulations
Recognize safety hazards at each work site (e.g., trees, underground utilities)
Minimize risks associated with safety hazards
Monitor regulation updates
Follow government regulations and restrictions
Apply fire safety rules and procedures
Apply basic knowledge of first aid and CPR when necessary
BIL: Essential

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Competency: Operate equipment safely

Competency Builders:
Follow safety rules for equipment operation and maintenance
Comply with safety zones around equipment
Operate equipment defensively
Interpret safety symbols
Use slow-moving vehicle signs when operating vehicles on road
Keep riders off mobile equipment
 Maintain safety shields on all equipment
Shut down power equipment before servicing
Report potential equipment safety hazards
Follow manufacturer's service recommendations
Maintain valid driver's license
Perform lockout and tagout
Identify equipment safety issues
Unit: Basic Accounting

BIL: Essential

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Competency: Use arithmetical skills for accounting

Competency Builders:
Compute cash discounts for various terms
Compute extension, sales tax, and totals of sales slips
Competency:  Identify accounting principles

Competency Builders:
Identify basic accounting principles
Identify basic accounting applications
Explain use of record keeping in relation to business and economical applications
Prepare budgets
Prepare comparative (actual vs. budget) income statement
Define cost accounting, direct materials, direct labor and overhead
Calculate depreciation
Complete a profit and loss statement
Unit: Daily Management Tasks

BIL: Essential

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Competency: Perform general office duties

Competency Builders:
Use office machines
Plan work schedules
Operate computer
Maintain organized work area
Take proper notes
Communicate messages properly
BIL:    Recommended

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Competency:    Order merchandise

Competency Builders:
Identify when to order particular merchandise
Identify where to order particular merchandise
Identify how to order particular merchandise
Identify how much merchandise to order
Outline amount of storage needed
Use price lists and catalogs
Unit: Supervision

BIL: Essential

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Competency: Demonstrate human resource skills

Competency Builders:
- Apply interview skills
- Apply appropriate management and leadership styles
- Display managerial and supervisory skills
- Apply human relations skills
- Communicate performance expectations
- Adhere to company policies regarding discrimination and harassment
- Document personnel issues
- Recognize legal requirements of employee and employer relations
- Display team building skills
BIL:    Recommended

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Competency:    Manage human resources

Competency Builders:
Use foresight to anticipate and manage change
Discipline employees
Counsel employees (e.g., career objectives)
Dismiss employees
Maintain performance records
Address employees regarding disciplinary action
Recommend employee for promotion
Explain procedure for handling grievances
Evaluate employee performance
BIL: Essential

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Competency: Manage work flow

Competency Builders:
Communicate operating policies and procedures
Meet production standards
Interface with other departments/crews
Prioritize work
Assign work to other crew members
Delegate work
Provide instructions
Monitor progress
Complete productivity reports
Complete managerial reports
Maintain appropriate work environment
Troubleshoot operational problems
Complete assigned tasks in a timely manner
Coordinate with team members
BIL: Recommended

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Competency: Manage projects

Competency Builders:
Develop strategic plan
Develop project budget
Schedule work assignments
Apply quality measures and counter measures
Unit: Sales and Marketing

BIL: Essential

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Competency: Promote company image

Competency Builders:
- Explain importance of image
- Identify factors affecting image, positive and negative
- Project company image
- Exhibit good personal hygiene
- Perform quality work
- Follow instructions and uniformity
- Keep equipment clean
- Follow dress code
- Handle customer complaints
- Communicate positively with customers
- Read company manual
- Maintain continuity and uniformity of company logo
- Follow customer awareness programs
**BIL:** Recommended

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**Competency:** Demonstrate presale skills

**Competency Builders:**
- Maintain product and service knowledge
- Differentiate between product features and product benefits
- Examine types of selling techniques
- Identify types of customers
- Identify customer buying motives and signals
- Maintain prospective customer relationship
BIL: Recommended

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Competency: Demonstrate post sale skills

Competency Builders:
Compose personal appreciation notes
Follow up purchases and sales
Develop repeat customer contact list
Add customer to annual mailings
Develop a follow-up file
Demonstrate seasonal greetings
BIL:  Recommended

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Competency:  Conduct sale

Competency Builders:
- Greet customers
- Use appropriate questioning techniques
- Use appropriate selling techniques
- Identify customer needs, problems and recommendations
- Describe services and expectations
- Explain extent of guarantee
- Access support services
- Close sale
- Use good telephone skills
- Compute taxes
- Record sales information
- Utilize product demonstrations, exhibits, and displays
- Address customer complaints
- Resolve customer complaints
- Process tax exempt sales transactions
- Process charge account sales transaction
- Process charge card sales transaction
- Calculate customer discount
- Wrap purchases
- Handle special orders
BIL: Recommended

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Competency: Prepare estimate

Competency Builders:
- Calculate square footage and cubic yards
- Use price list
- Estimate total amount of materials needed
- Estimate fixed costs
BIL: Recommended

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Competency: Advertise products and services

Competency Builders:
Identify products and services to be presented
Identify opportunities for publicity
Implement presentation
Prepare advertising materials
Implement product demonstrations, exhibits, and displays
Select signs
Arrange retail area according to season
Competency: Maintain price lists and catalogs

Competency Builders:
Compare prices of similar products and services
Outline material and service availability
Keep product and service catalogs current
Keep profit and loss in line
BIL: Recommended

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Competency: Price merchandise/service

Competency Builders:
Estimate fixed and variable expenses
Calculate markup
Calculate break-even point
Compare pricing strategies
Identify factors affecting pricing
Price merchandise
Prepare merchandise for inventory or display
Use computerized pricing systems
Attach price tags
BIL: Recommended

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Competency: Display merchandise

Competency Builders:
- Design displays
- Set up displays
- Select items for display
- Use props
- Identify display areas
BIL: Essential

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Competency: Provide technical assistance

Competency Builders:
Provide customer with informative materials
Interpret product labels
Provide care and safety instructions
Demonstrate product use
Explain safety precautions regarding product use or application
Outline extent of product guarantee
Address customer complaints
Identify when merchandise is to be delivered
Provide specialized care instructions
Unit: Horticulture Fundamentals

BIL: Essential

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Competency: Demonstrate knowledge of the horticulture industry

Competency Builders:
- Identify fields of endeavor within the horticulture industry
- Describe economic importance of the horticulture industry
- Describe environmental importance of the horticulture industry
- Identify employment opportunities within the horticulture industry
- Identify regulatory aspects of the horticulture industry
- Identify continuing education opportunities within the horticulture industry
- Identify professional organizations within the horticulture industry
BIL: Essential

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Competency: Identify plants

Competency Builders:
- Classify plants as monocots or dicots
- Identify plants using scientific and common name
- Spell and pronounce using scientific and common name
- Classify plants as annuals, biennials, and perennials
- List environmental preference of plants (e.g., shade, sun, wind, moisture, soil conditions)
- Classify plants according to growth habit
Competency: **Demonstrate pruning skills**

**Competency Builders:**
Identify methods of pruning plants to achieve desired growth
Select proper pruning tools for the task
Identify appropriate time to prune plants
Explain root pruning appropriate plants
Prune plants for desired shape and growth
Identify means of sterilizing pruning tools
Distinguish between proper pruning and shearing
Develop proper pruning equipment maintenance (e.g., schedule repair)
BIL: Essential

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Competency: Keep records

Competency Builders:
Keep fertilizer and pesticide application records
Keep equipment maintenance and service records
Keep job records and daily log sheets
Keep inventory records
Unit: Horticultural Plant Health Care

BIL: Essential

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Competency: Make proper plant selection

Competency Builders:
- Identify plants appropriate to a region
- List environmental preference of plants (e.g., shade, sun, wind, moisture)
- Classify plants according to growth habit
- Match tree and planting site
- Describe installation
- Perform planting and transplanting
- Describe proper care after planting
- Identify disease-resistant and insect-resistant species/cultivars
BIL: Essential

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Competency: Demonstrate knowledge of cultural practices

Competency Builders:
- Demonstrate knowledge of soils
- Demonstrate knowledge of soil, water, air relationship, temperature, light and fertilizer
- Explain methods of plant-water management
BIL: Essential

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Competency: Explain knowledge of irrigation and drainage

Competency Builders:
Explain methods of aerification and vertical mulching
Explain irrigation procedures
Explain aerification procedures
Explain drainage procedures
Explain importance of mulch (e.g., air, water, temperature, nutrients)
Identify types of mulching materials
Demonstrate proper mulching techniques
BIL: Essential

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Competency: Manage pests

**Competency Builders:**
- Classify insects according to feeding habits
- Identify common insects, weeds, and diseases of plants
- Describe life cycle of insect pests, weeds and diseases
- Describe methods (i.e., biological, chemical, and cultural) of managing plant insects, weeds and diseases
- Report insect, weeds and disease damage for proper control measures
- Interpret information on a pesticide/agricultural chemical label
- Interpret spray compatibility charts
- Select pesticides according to the product label
- Simulate mixing of pesticides according to the product label
- Apply fundamentals of IPM
- Simulate application of pesticides according to the product label
- Clean spray equipment
- Calibrate spray equipment
- Dispose of pesticide containers in compliance with local, state, federal, and EPA regulations
- Maintain pesticides records
- Describe symptoms of pesticide poisoning and identify first aid required
- Select pesticide according to controlling action (e.g., stomach, contact, systemic)
- Identify chemical injury to plants
- Take pesticide applicator test
BIL: Recommended

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Competency: Manage pests in trees and shrubs

**Competency Builders:**
- Select the proper pesticide
- Identify coverage and coverage requirements
- Prepare pesticide solutions
- Adjust sprayers
- Operate sprayers
- Simulate spraying of prescribed area safely
- Clean sprayers
- Repair sprayers
Competency: Implement integrated pest management (IPM) program

Competency Builders:
Follow general safety precautions
Identify insects, diseases, weeds, and vertebrate pests
Identify pest damage
Calculate area to be covered
Complete certification requirements for prescribed chemical application
Evaluate chemical/cultural/biological control options
Interpret chemical labels and compatibility charts
Identify appropriate methods
Estimate pest population numbers
Assess degree of damage
Outline when management is needed
Map chemical application, methods, and results
Document chemical application, methods, and results
Compute treatment costs
Recognize environmental limitations
Select options
BIL: Essential

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Competency: Identify tree and shrub pests

Competency Builders:
Differentiate chewing, sucking, boring, and rasping insects
Differentiate bacterial, viral, and fungal diseases
Explain preventative measures to protect trees and shrubs from injuries
BIL: Essential

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Competency: Diagnose and treat plant problems

Competency Builders:
Demonstrate the diagnostic process
Explain tree "stress" and the "healthy" tree
Identify common insects and diseases
Identify physiological disorders and injuries
Describe prevention treatment and continued health care
Demonstrate methods of applying fertilizer to trees and shrubs
Identify abiotic problems (e.g., weedeater, mechanical, paving damage)
**BIL:** Essential

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**Competency:** Demonstrate proper pruning practices as related to plant health care

**Competency Builders:**
- Identify dead, diseased, and dying branches and plants
- Demonstrate proper pruning/removal techniques
- Demonstrate importance of maintaining natural growth habit of plants
- Explain importance of timing as related to pruning, mowing, etc.
- Demonstrate accepted industry standards
BIL: Essential

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Competency: Apply fertilizers

Competency Builders:
Identify soil and media materials
Identify types and kinds of fertilizers
Identify methods of distributing fertilizers
Interpret information on tag or container
Identify symptoms of nutritional deficiencies of plants
Collect a soil sample for soil analysis
Identify fertilization requirements of plant materials
Set a fertilizer schedule
Apply fertilizer and soil amendments
Apply special fertilization methods appropriate to a region/plant group
Describe symptoms of fertilizer burn
Clean fertilizer application unit
Maintain fertilization records
Unit: Equipment Maintenance

BIL: Essential

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Competency: Maintain equipment

Competency Builders:
Follow general safety precautions
Calibrate equipment
Adjust belts
Adjust chains
Inspect assembled equipment for operating defects
Lubricate parts
Sharpen equipment
Maintain service records
Establish a preventative maintenance program
**BIL:** Essential

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**Competency:** Maintain engine cooling systems

**Competency Builders:**
- Follow general safety precautions
- Test coolant mixture
- Adjust or replace fan belt
- Replace hoses
- Inspect for leaks
- Add coolant
- Flush cooling system
- Dispose of coolant and containers safely
BIL: Essential

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Competency: Service engine lubricant systems

Competency Builders:
Follow general safety precautions
Check oil level
Select oil
Change oil and oil filters
Maintain grease fittings
Replace grease fittings
Grease or oil joints
Dispose of oil and containers safely
BIL: Essential

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Competency: Maintain small-engine fuel and air systems

**Competency Builders:**
- Follow general safety precautions
- Service air cleaner
- Bleed diesel fuel system
- Mix gas and oil for two-cycle engine
- Service crankcase ventilation components
- Clean carburetor
- Adjust carburetor
- Service fuel filter assembly
- Replace exhaust system components
- Add proper fuel
BIL: Essential

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Competency: Maintain small-engine electrical systems

**Competency Builders:**
Follow general safety precautions
Replace spark plugs and wires
Clean spark plugs
Adjust spark plug gap
Check specific gravity of battery
Install battery
Clean battery terminals, cables, and battery box
Charge battery
Replace fuses and light bulbs
BIL: Essential

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Competency: Service wheels and tires

Competency Builders:
Follow general safety precautions
Inspect tires
Check tire pressure
Inflate tires
Tighten lug nuts
Replace flat tires
Rotate tires
Check valve stems
Patch tubes
Competency: Maintain hydraulic systems

Competency Builders:
Follow general safety precautions
Inspect system for oil leaks
Clean couplings
Inspect hoses
Identify proper reservoir
Check oil
Add oil
Replace oil filter
Dispose of hydraulic fluids safely
Bleed air from system
Replace hoses
BIL:       Essential

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Competency:  Perform predeparture functions

Competency Builders:
Follow general safety precautions
Connect front-end-operated equipment
Connect 3-point-hitch equipment
Attach power takeoff equipment
Detach power takeoff equipment
Hitch towed equipment
Connect hydraulic lines
Connect electrical hookups
Connect safety chains
Refuel power units
Inspect working condition of lights
Check fluid levels
Secure all equipment and materials
Check tires and tire pressure
Check mirrors
Maintain service schedule
Check prestart mechanism
Flag extended materials
Inspect belts
Adjust belts
Add coolant
Inspect for leaks
Service air cleaner
Mix gas and oil for two-cycle engine
Label fuel containers properly
BIL: Recommended
(BIL strongly recommends that this competency be addressed)

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Competency: Operate equipment and vehicles

Competency Builders:
Follow general safety precautions
Adjust throttle for operating conditions
Interpret equipment gauges
Start engine
Shut down engine
Use hand operating signals
Operate manual transmission
Preheat diesels
Secure vehicle when parked
Operate automatic transmission
Use brake systems
Adjust seating and steering
Set out safety markers
Flag extended materials
Operate liftgates
Operate dump beds
Operate winch
Operate snowplow
Operate utility vehicles
Obtain driver's license
Operate aerial lift
Jump-start vehicle
BIL: Essential

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Competency: Operate power equipment as required

Competency Builders:
Follow general safety precautions
Use and calibrate equipment/spray equipment
Use rotary tiller
Use edger
Use blower
Use aerator
Use roller
Use mowing equipment
Use trimming equipment
Use lawn sweepers
Use sod cutter
Use chain saw
Use verticutter/turf groomers
Use tractor
Use and calibrate spray equipment
Use power washer
Use straw blowers
Use hand-held augers
Use power tamp
Use skid loader
Use trencher
Use backhoe
Use hydroseeders/mulchers
Use chippers
Use tree spade
Use cutoff saws
Use landscape rake
Use hydraulic tools
BIL: Essential

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Competency: Clean and store equipment

**Competency Builders:**
- Follow general safety precautions
- Remove debris from equipment
- Use steam or high-pressure wash equipment
- Prepare engines for storage
- Lubricate equipment for storage
- Drain pumping system
**BIL:** Essential

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**Competency:** Use hand, power, and pneumatic tools

**Competency Builders:**
- Follow general safety precautions
- Identify tools needed for job/task
- Select tools according to job/task
- Set up tools
- Adjust tools
- Clean tools
- Lubricate tools
- Recondition tools
- Sharpen tools
- Store tools
BIL: Recommended

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**Competency:** Apply protective coatings

**Competency Builders:**
- Follow general safety precautions
- Clean surface
- Sand surface
- Apply masking tape
- Thin paint
- Mix primer coat
- Apply primer coat
- Apply wood preservative
- Use steam and high-pressure wash equipment
- Identify types of coatings
- Use environmentally safe preservative
**BIL:** Essential

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**Competency:** Maintain application equipment

**Competency Builders:**
- Follow general safety precautions
- Lubricate spreader
- Dispose of waste safely
- Calibrate spreader
- Clean blade propeller
BIL: Recommended

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Competency: Weld with gas

Competency Builders:
Follow general safety precautions
Set up gas welding equipment
Adjust gas welding equipment
Select rod
Apply flux
Cut metal
Weld steel in horizontal positions
Weld steel with filler rod
Braise metal
Clean equipment
Store gas cylinders safely
BIL:  Recommended

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Competency:  Weld with electric arc

Competency Builders:
Follow general safety precautions
Select welding equipment and accessories
Select electrode sizes and types
Select settings
Prepare metal
Weld steel in non-horizontal positions
Weld steel in horizontal positions
Weld pipe
Cut metal
Store equipment
Unit: Landscape Technology

BIL: Essential

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Competency: Prepare estimate and contracts

Competency Builders:
List materials required for the project
Identify equipment needs
Estimate time and man hours
Outline costs of materials, equipment, and labor
Prepare price for customer based on specifications
**BIL:** Essential

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**Competency:** Organize the project (landscape and/or interiorscape)

**Competency Builders:**
- Interpret plans and specifications
- Identify safety requirements
- Organize site preparation
- Locate project materials
- Outline personnel needs
- Outline equipment needs
- Outline project schedule
BIL: Essential

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Competency: Maintain landscapes and equipment

Competency Builders:
Identify water requirements
Apply water at proper rates
Identify weeds
Apply herbicides safely
Apply fertilization requirements at proper rates
Apply corrective measures to pest, insect, and disease problems
Prune landscape plants
Maintain turf viability (i.e., mow at proper height and frequency, aerate, edge, clip, and remove trash)
Cultivate plants
Remulch plants
Stake trees
Repair landscape plants (e.g., trees, shrubs)
Provide protection for plants from adverse weather conditions
Maintain landscape equipment
Demonstrate procedures for protecting plants from adverse weather
Demonstrate procedures for protecting equipment from adverse weather
**BIL:** Essential

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**Competency:** Maintain customer relations

**Competency Builders:**
Conduct walk-through of project with client to assure satisfaction
Identify current and future maintenance requirements
BIL: Essential

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Competency: Maintain landscape tools and equipment

Competency Builders:
- Identify equipment needs for the company
- Operate equipment for the job
- Demonstrate the service and maintenance of power equipment
- Demonstrate the repair and maintenance of facilities
- Instruct employees in the safe use of tools and equipment
- Demonstrate the safe use of tools and equipment to employees
- Develop preventative maintenance program for landscape equipment
Unit: Turf and Landscape Operations

BIL: Essential

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Competency: Identify plant requirements and value

Competency Builders:
- Identify hardiness zones
- Identify landscape value
- Identify plant environmental preferences
- Identify planting and maintenance levels
- Identify environmental value
Competency: Identify and classify plants

Competency Builders:
- Classify turf and landscape plants as monocots or dicots
- Classify turf and landscape plants as annuals, biennials, or perennials
- Identify bulbs
- Identify annual flowers
- Identify perennial flowers
- Identify shade trees
- Identify ornamental trees
- Identify ornamental grasses
- Identify shrubs
- Identify ground covers
- Identify conifers
- Identify plants according to scientific name
- Identify environmental plant preferences
- Classify plants according to growth habit
- Identify wildflowers
- Identify herbs
- Identify fruit trees
- Identify ferns
- Identify weeds
- Identify turfgrasses
- Identify vines
- Identify vegetable plants
- Identify improved varieties
- Identify foliage plants
- Identify flowering plants
BIL: Essential

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Competency: Prepare for installation

Competency Builders:
Follow general safety precautions
Outline planting depth
Outline planting time
Interpret seed and bulb tag information
Read landscape plan
Convert scale to site
Identify material quantities
Identify underground utilities
Plan planting schedules
Plan soil erosion controls
Prepare seeds for sowing
Match plant requirements to environmental conditions
Select seeds and plants
Follow planting rate recommendations
BIL: Recommended

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Competency: Prepare soil mixes

Competency Builders:
- Follow general safety precautions
- Identify soil types
- Mix materials
- Prepare compost
- Identify mixing techniques
- Identify media materials
BIL: Essential

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Competency: Prepare planting area

Competency Builders:
Follow general safety precautions
Define areas
Provide rough grade
Create contour
Incorporate soil amendments
Provide finish grade
Apply soil amendments
Competency: Install turf, landscape, and nursery plants

Competency Builders:
Follow general safety precautions
Plant seeds
Plant bulbs
Plant shrubs
Plant ground covers
Plant annual and perennial plants
Plant trees
Stake trees
Guy trees
Water in plant material
Lay sod
Apply mulch
Plant drought-resistant and disease-resistant cultivars
Sterilize equipment
Divide plants
Separate plants
Pot trees and shrubs
Transplant seedlings
Identify planted specimens
Perform initial waterings
BIL: Essential

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Competency: Fertilize plants

Competency Builders:
Follow general safety precautions
Interpret manufacturer's fertilization rate charts
Interpret fertilizer labels
Identify application methods
Calibrate fertilizer application equipment
Mix fertilizer solutions
Apply liquid fertilizer
Apply dry fertilizer
Identify application pattern
Identify nutrient requirements
Identify symptoms of nutrient deficiency
Identify kind and amount of fertilizer and soil amendments to apply
Select application method
Use fertilizer injectors
Use organic fertilizers
Use polymers
Maintain fertilizer records
Competency: Maintain plants

Competency Builders:
Follow general safety precautions
Pinch plants
Cultivate plants
Water plants
Apply mulches
Prune trees
Prune shrubs
Transplant bulbs, corms, and tubers
Treat tree wounds
Remove fallen leaves
Remove old flowers
Apply growth-regulating compounds
Maintain plants on arbors and trellises
Compost plant debris
Use growth regulators
Disbud flowering plants
Thin plants, seedlings, and cuttings
Space plants
Repot plants
Stake trees
Guy trees
Climatize plants
Weed fields
Check for insect and disease problems
Weed planting beds
BIL: Essential

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Competency: Maintain turfgrasses

Competency Builders:
- Follow general safety precautions
- Apply top dressing to turfgrass areas
- Verticut turf
- Overseed turf
- Water turf
- Arify turf
- Renovate turf
- Fill in holes and depressions in turf
- Relocate holes and tee markers
- Slit seed turf
- Mow turf
- String trim turf
- Edge turf
- Apply growth regulators
- Compost clippings
BIL: Essential

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Competency: Prune plants

Competency Builders:
Follow general safety precautions
Identify pruning tools
Sterilize pruning equipment
Identify pruning time
Identify structural problems
Identify lowest branch height
Outline desired shape
Identify water sprouts
Space branches
Select scaffold branches
Prune shrubs
Root prune
Train central leaders
Unit: Nursery Production Management

BIL: Essential

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Competency: Identify plant requirements and value

Competency Builders:
- Identify hardiness zones
- Identify landscape value
- Identify plant environmental preferences
- Identify planting and maintenance levels
- Identify environmental value
Competency: Identify and classify plants

**Competency Builders:**
- Classify turf and landscape plants as monocots or dicots
- Classify turf and landscape plants as annuals, biennials, or perennials
- Identify bulbs
- Identify annual flowers
- Identify perennial flowers
- Identify shade trees
- Identify ornamental trees
- Identify ornamental grasses
- Identify shrubs
- Identify ground covers
- Identify conifers
- Identify plants according to scientific name
- Identify environmental plant preferences
- Classify plants according to growth habit
- Identify wildflowers
- Identify herbs
- Identify fruit trees
- Identify ferns
- Identify ferns
- Identify weeds
- Identify vines
- Identify improved varieties
- Identify foliage plants
- Identify flowering potted plants
BIL: Essential

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**Competency:** Prepare for planting and propagation

**Competency Builders:**
- Follow general safety precautions
- Outline planting rates
- Outline planting depth
- Outline planting time
- Interpret seed and bulb tag information
- Prepare seeds for sowing
- Match plant requirements to environmental conditions
- Select seeds, plants, and cuttings
- Sterilize equipment and containers
- Follow planting rate recommendations
BIL: Essential

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Competency: Prepare media mixes

**Competency Builders:**
- Follow general safety precautions
- Identify soil types
- Mix media materials
- Prepare compost
- Identify mixing techniques
- Identify media materials
BIL: Essential

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Competency: Prepare planting area

Competency Builders:
Follow general safety precautions
Incorporate soil amendments
Apply soil amendments
Identify surface drainage areas
BIL: Essential

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Competency: Prepare for planting

Competency Builders:
- Follow general safety precautions
- Plant seeds
- Plant bulbs
- Plant shrubs
- Plant ground covers
- Plant annual and perennial plants
- Plant trees
- Stake trees
- Water in plant materials
- Apply cover crops as needed
- Plant drought-resistant and disease-resistant cultivars
- Take cuttings
- Sterilize equipment
- Divide plants
- Separate plants
- Perform grafts and bulbs
- Pot trees and shrubs
- Transplant cuttings and seedlings
- Apply rooting hormone
- Identify planted specimens
- Perform initial waterings
BIL: Essential

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Competency: Fertilize plants

**Competency Builders:**
Follow general safety precautions
Interpret manufacturer's fertilization rate charts
Interpret fertilizer labels
Identify application methods
Calibrate fertilizer application equipment
Mix fertilizer solutions
Apply liquid fertilizer
Apply dry fertilizer
Identify application pattern
Identify nutrient requirements
Identify symptoms of nutrient deficiency
Identify kind and amount of fertilizer and soil amendments to apply
Select application method
Use fertilizer injectors
Use organic fertilizers
Use polymers
Maintain fertilizer records
Competency: Maintain plants

Competency Builders:
Follow general safety precautions
Pinch plants
Cultivate plants
Water plants
Apply mulches
Prune trees
Prune shrubs
Transplant bulbs, corms, and tubers
Treat tree wounds
Remove fallen leaves
Remove old flowers
Apply growth-regulating compounds
Maintain plants on arbors and trellises
Compost plant debris
Use growth regulators
Disbud flowering plants
Thin plants, seedlings, and cuttings
Space plants
Repot plants
Wrap trees
Stake trees
Guy trees
Climatize plants
Weed fields
Check for insect and disease problems
Weed planting beds
**BIL:** Essential

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**Competency:** Prune plants

**Competency Builders:**
- Follow general safety precautions
- Identify pruning tools
- Sterilize pruning equipment
- Identify pruning time
- Identify structural problems
- Identify lowest branch height
- Outline desired shape
- Identify water sprouts
- Space branches
- Select scaffold branches
- Prune shrubs
- Root prune
- Train central leaders
BIL: Essential

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Competency: Harvest plants

Competency Builders:
Follow general safety precautions
Package plants
Label plants
Clean plants
Acclimate plants
Grade plants
Preserve plant viability
Apply antidesiccants
Wrap tree head
Dig shrubs and trees
Ball shrubs and trees
Burlap shrubs and trees
Harvest bare root stock
Comply with regulations regarding plant inspection and movement
Apply American Association of Nurserymen (AAN) sizing/grading standards
Unit: Irrigation

BIL: Essential

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Competency: Maintain water delivery systems

Competency Builders:
- Identify types of pipe, pipe fittings, insulation, and plumbing fixtures
- Open trench line
- Locate existing underground water lines
- Cut and fit pipe or tubing (e.g., PVC, aluminum)
- Tap into existing waterlines
- Install pipe and pipe fittings
- Install valves and faucets
- Install filters
- Test sprinkler spray patterns
- Adjust sprinkler spray patterns
- Backfill trenches
- Replace gaskets
- Unclog pipes
- Install flow-control devices
- Winterize water delivery systems
- Maintain filter system
- Install insulation
- Maintain automatic waterers
- Install sprinkler heads and mist heads
- Repair lines and nozzles on spray equipment
- Repair broken pipes, sprinkler heads, mist heads, valves, and faucets
- Thread metal pipe
- Troubleshoot automatic sprinkler system
- Repair automatic sprinkler system
BIL: Essential

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Competency: Operate irrigation system

Competency Builders:
Follow general safety precautions
Determine sprinkler precipitation rate
Adjust sprinkler patterns
Adjust water pressure
Program automatic timers
Hand water plants
Calibrate injection systems
Monitor injection systems
Winterize systems
Unit: Landscape Design

BIL: Essential

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Competency: Conduct site analysis

Competency Builders:
- Identify soil types
- Identify rock outcroppings
- Identify water sources
- Identify existing vegetation
- Identify existing structures
- Identify direction (North, South, East, West)
- Identify climate of site
- Identify location of utilities
- Identify legal aspects of site, right of ways
- Identify circulation routes
- Cite unfavorable and favorable views
- Cite location of pedestrian traffic
- Cite noise sources
- Cite dust sources
- Cite sources of bright light
- Evaluate equipment accessibility
BIL: Essential

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Competency: Analyze customer needs

Competency Builders:
- Identify general entertaining preferences
- Identify sports areas
- Identify cooking needs, indoor and/or outdoor
- Identify gardening and/or bird watching preferences
- Identify pet needs
- Identify storage needs
- Identify laundry needs
- Identify cost parameters for project
- Identify family needs (e.g., children, plant preferences, colors)
BIL: Essential

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**Competency:** Perform area layout

**Competency Builders:**
- Layout public area
- Layout private/outdoor living area
- Layout service/utility area
BIL: Essential

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Competency: Apply principles of design

Competency Builders:
Use principle of simplicity
Use principle of contrast
Use principle of transition
Use principle of radiation
Use principle of scale
Use principle of rhythm
Use principle of balance (symmetry, asymmetry)
Use principle of unity
Use principle of harmony
Use principle of focus
**BIL:** Essential

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**Competency:** Apply elements of design

**Competency Builders:**
- Use element of texture
- Use element of color
- Use element of form
- Use element of size and mass
- Use element of line and direction
- Use element of space
- Use element of shadow
BIL: Essential

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Competency: Describe how plants are used in design

Competency Builders:
- Describe plants used as shade and/or as climate control
- Describe plants used as enframement
- Describe plants used as background
- Describe plants used as boundary or border
- Describe plants used as screens
- Describe plants used as accents
- Describe plants used as softening architectural lines or features
- Describe plants used as specimen plants
- Describe plants used as foundation plantings
- Describe plants used as ground cover plantings
- Describe plants used as espalier plantings
- Describe plants used in muffling noise
- Describe plants used in attracting wildlife
- Describe plants used in the creation of illusion of space, size, and distance
- Describe plants used in direction of traffic
- Describe plants used as fruit, flower, fragrance
**BIL:** Essential

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**Competency:** Correlate architecture with landscape design

**Competency Builders:**
- Identify types of landscape design suitable for Colonial architecture
- Identify types of landscape design suitable for European architecture
- Identify types of landscape design suitable for Oriental architecture
- Identify types of landscape design suitable for Contemporary architecture
BIL: Essential

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Competency: Plan transport structures

Competency Builders:
Plan walks
Plan driveways
Plan steps
Plan decks and patios
Plan handicap accessibility
BIL: Essential

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Competency: Plan retention structures

Competency Builders:
Plan fences and walls
Plan miscellaneous structures (e.g., gazebos, lawn statuary)
BIL: Essential

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Competency: Describe use of structural materials

Competency Builders:
Describe advantages and disadvantages of using asphalt
Describe advantages and disadvantages of using concrete
Describe advantages and disadvantages of using brick
Describe advantages and disadvantages of using flagstone
Describe advantages and disadvantages of using field stone
Describe advantages and disadvantages of using loose aggregates
Describe advantages and disadvantages of using wood
Describe advantages and disadvantages of using tanbark and wood chips
Competency: Identify plant considerations

Competency Builders:
Describe habits of growth of various plants
Describe hardiness of various plants
Describe maintenance of various plants
Describe fruit, flower, foliage, and branching characteristics of various plants
Differentiate evergreen and deciduous plants
Describe advantages and disadvantages of various trees, shrubs, ground covers, espaliers, and vines
Describe color coordination
Describe use of bedding plants and ground covers
BIL: Essential

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Competency: Address problem areas of landscape design

Competency Builders:
- Address slopes and erosion control
- Address harsh exposure
- Address poor drainage
- Address cuts
- Address fills
- Address compaction
- Address retention of existing vegetation
BIL: Recommended

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Competency: Design special types of gardens

Competency Builders:
Design rock gardens
Design Japanese gardens
Design formal gardens
Design informal gardens
Design perennial gardens
Design shade and forest gardens
**BIL:** Essential

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**Competency:** Design around focal point(s)

**Competency Builders:**
- Design around ponds, basins, pools, waterfalls, and fountains
- Place outdoor lighting properly to enhance focal point(s)
- Place irrigation system properly to enhance focal point(s)
- Install sod and lawn around focal point(s)
BIL: Essential

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Competency: Apply landscape grading techniques

Competency Builders:
Interpret prints and specifications
Locate utilities
Build topographic features
BIL: Essential

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Competency: Install plant materials

**Competency Builders:**
- Interpret prints and specifications
- Install trees
- Install shrubs
- Install ground covers, annuals, or perennials
- Provide for weed control
- Apply mulches (e.g., plastic, organic, fiberglass)
- Apply herbicides
- Provide for erosion control
- Edge beds
- Outline costs and labor for installation
- Water as required
- Fertilize as required
BIL: Essential

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Competency: Explain use of various construction materials

Competency Builders:
Describe uses and costs of lumber in landscape design
Describe uses and costs of railroad ties in landscape design
Describe uses and costs of brick in landscape design
Describe uses and costs of block in landscape design
Describe uses and costs of stone and flagstone in landscape design
Describe uses and costs of gravel in landscape design
Describe uses and costs of plastic and fiberglass in landscape design
Describe uses and costs of concrete in landscape design
Describe uses and costs of metal in landscape design
Describe uses and costs of sand in landscape design
Describe uses and costs of artificial turf in landscape design
BIL: Essential

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Competency: Construct garden surfaces

Competency Builders:
- Construct garden paths and walks
- Construct patios and terraces
- Construct steps
- Construct foot bridges
- Identify costs of labor and materials involved in constructing garden surfaces
BIL: Essential

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Competency: Construct landscape enclosures

Competency Builders:
Construct raised beds
Construct retaining walls and free standing walls
Construct fences, screens, and gates
Construct trellis
Identify costs of labor and materials involved in constructing enclosures
Construct other structures
BIL: Recommended

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Competency: Install electrical landscape features

Competency Builders:
Install outdoor lighting
Install submersible pumps
Install timers and valves
Follow electrical contractor’s code
Identify costs of labor and materials involved in installing electrical features
BIL: Recommended

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Competency: Construct water features

Competency Builders:
- Construct pools
- Construct fountains
- Construct waterfalls
- Construct creek beds
- Identify costs of labor and materials involved in constructing water features
BIL: Recommended

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Competency: Construct irrigation and drainage systems

Competency Builders:
Apply knowledge of pressure and flow
Apply knowledge of pipes, nozzles, and valves
Apply knowledge of trenching
Install tile
Install sumps and drains
Identify costs of labor and materials involved in constructing irrigation and drainage systems and site reclamation
Compare sprinkler, bubbler and drip irrigation systems
BIL: Essential

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Competency: Maintain customer relations

Competency Builders:
Conduct walk-through of project with client to assure satisfaction
Identify current and future maintenance requirements
Unit:    Drafting Technology

BIL:    Essential

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Competency:    Apply basic drafting skills

Competency Builders:
Use drafting equipment, measuring scales, drawing media, drafting instruments and consumable materials, blueprint machine
Identify line styles and line weights
Select proper drawing scale, introduction to different types
Prepare title blocks and other drafting formats
Apply forehand and other lettering techniques
Prepare multi-view drawings
Prepare multi-view sketches
Prepare orthographic views
Prepare change control block
Describe change control block/revision block
Measure angles
Draw horizontal, vertical, angular, parallel, and perpendicular lines
Transfer an angle
Control tangent lines (to arcs) and tangent arcs (to arcs)
Bisect lines, angles, and arcs
Divide lines
Construct three-point circle
Construct regular hexagon, pentagon, and octagon
Reproduce a drawing
Prepare single-view drawings
Prepare dimension drawings
Interpret notes and dimensions to determine part
Draw arcs, circles, and conics
Transfer measurements

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BIL:  Essential

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Competency:  Apply intermediate drafting skill

Competency Builders:
- Describe types of diazo and their applications
- Apply isometric, oblique and perspective sketching techniques
- Prepare isometric, oblique and perspective sketches
- Prepare sectional views
- Prepare auxiliary views
- Identify landscape symbols
- Apply systems drafting techniques
- Identify a materials list
- Describe purpose of auxiliary and sectional views
BIL: Recommended

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Competency: Apply advanced drafting skills

Competency Builders:
- Interpret reports and specifications
- Prepare pictorial drawings
- Prepare schematics
**BIL:**  Essential

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**Competency:**  Interpret prints

**Competency Builders:**
- Visualize object from drawing
- Interpret sectional views
- Interpret dimensions
- Interpret tolerances
- Interpret special symbols
- Interpret schematics
**BIL:** Recommended

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**Competency:** Convert dimensions and tolerances

**Competency Builders:**
Convert dimensions and tolerances from English units to metric units
Convert dimensions and tolerances from metric units to English units
BIL: Essential

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Competency: Demonstrate dimensioning techniques

Competency Builders:
- Construct arrowheads using various styles/disciplines
- Apply symbols for surface and texture control
- Add labels/notes to drawing
- Interpret decimal tolerance dimensions
- Dimension arcs
- Dimension angles
- Dimension curves
- Dimension rounded-end shapes
- Dimension spherical objects
- Dimension cylindrical objects
- Dimension cones, pyramids, and prisms
- Dimension features on circular center line
- Dimension theoretical point of intersection
- Dimension object using rectangular coordinate system
- Dimension object using polar coordinate system
- Dimension object using tabular coordinate system
- Dimension object using ordinate dimensioning system
Unit: Computer Aided Design (CAD) Fundamentals

BIL: Essential

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Competency: Operate a CAD system

Competency Builders:
Execute CAD system
Use keyboard input
Use screen and pull down menus
Use other input devices (e.g., scanner, digitizer)
Create scaled plots
Operate a pen plotter
Operate a printer-plotter (e.g., laser plotter)
Access online help for commands
Use file conversion
Use data transfer
**BIL:** Essential

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**Competency:** Select entities for action

**Competency Builders:**
- Add or remove entities separately
- Add or remove entities using a window
- Select entities using a fence
- Select entities by other methods (e.g., last, previous, type, all, etc.)
BIL: Essential

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Competency: Control display

Competency Builders:
- Apply view control while drawing (e.g., zoom and pan)
- Control view resolution (e.g., viewers)
- Save views
- Display views
BIL: Essential

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Competency: Extract basic entity and drawing information

Competency Builders:
- Measure distances
- Measure areas
- Identify coordinates
- List entity characteristics (e.g., length, size, location, properties, etc.)
Unit: Arboriculture

BIL: Essential

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Competency: Demonstrate knowledge of tree biology

Competency Builders:
Identify tree anatomy and physiology
Identify tree structure and function
Identify tree taxonomy
Use scientific nomenclature
Identify plant characteristics
Describe principles of identification
### Competency: Describe tree, soil, and water relationships

**Competency Builders:**
- Identify soil properties
- Explain root growth
- Describe water movement and retention
- Describe water management
- Describe tree nutrition and fertilization mineral requirements
Competency: Demonstrate knowledge of tree selection

Competency Builders:
Match tree and planting site
Describe installation
Explain planting and transplanting
Describe care after planting/transplanting
BIL:  Recommended

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Competency:  Transplant large trees and shrubs

**Competency Builders:**
Differentiate deciduous trees and shrubs
Differentiate needled, conifer, and broadleaf evergreen trees and shrubs
Describe tree and shrub growth requirements
Identify tree root systems
Harvest ball and burlap
Harvest bare root trees
Prepare holes for transplanting
Plant trees
Stake trees
Water trees
BIL: Essential
Not applicable for NT

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Competency: Prune mature trees and shrubs

Competency Builders:
Remove pruned materials
Dispose of pruned materials
Describe effect of tree growth habits on pruning operations
Differentiate pruning time for broadleaf evergreens and conifers, and deciduous shrubs
Use climbing equipment safely
Handle ladders
Use power wood chipper safely
Climb trees
Use aerial lift equipment safely
Select appropriate pruning equipment
Use hand pruning tools (e.g., saws, shears)
Operate saws and power shears safely
Operate hydraulic equipment
Competency: Explain pruning principles and techniques

Competency Builders:
Identify pruning cuts: CODIT (compartmentalization of decay in trees)
Explain central leader system
Explain open center system
Explain modified leader system
Explain espaliering
Explain topiary
Explain thinning
Explain heading back
Explain shearing
Explain root prune
**BIL:** Essential

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**Competency:** Maintain basic hand pruning tools and equipment

**Competency Builders:**
- Sharpen pruning tools and equipment
- Adjust pruning tools and equipment
- Lubricate pruning tools and equipment
- Store pruning tools and equipment
- Sterilize pruning tools
BIL: Essential
Not applicable for NT

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Competency: Work in the tree

**Competency Builders:**
- Demonstrate safe climbing techniques
- Demonstrate cabling and bracing
- Install lightning protection
- Use basic rigging systems
- Safely cull trees and shrubs
- Shape trees and shrubs
- Repair trees and shrubs
- Safely use ropes and knots
BIL: Essential

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Competency: Demonstrate diagnostic procedure for plant problems

Competency Builders:
Describe the diagnostic process
Explain tree stress and the "healthy" tree
Identify common insects and diseases
Describe physiological disorders and injuries
Describe prevention treatment and continued plant health care
Demonstrate methods of applying fertilizer to trees and shrubs
Identify abiotic problems (e.g., weedeater, mechanical, paving damage)
**BIL:** Essential

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**Competency:** Identify tree and shrub pests

**Competency Builders:**
- Differentiate chewing, sucking, boring, and rasping insects
- Differentiate bacterial, viral, and fungal diseases
- Explain preventative measures to protect trees and shrubs from injuries
BIL: Essential
Not applicable for NT

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Competency: Manage pests in mature trees and shrubs

Competency Builders:
Select the proper pesticide
Identify coverage and coverage requirements
Prepare pesticide solutions
Adjust sprayers
Operate sprayers
Spray prescribed area safely
Clean sprayers
Repair sprayers
BIL: Essential

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Competency: Evaluate trees

Competency Builders:
- Identify nutritional deficiencies
- Prevent injury to trees and shrubs
- Recognize mechanical injury
- Recognize damage caused by rodents and deer
- Recognize water injury
- Recognize hazardous trees
BIL: Essential
Not applicable for NT

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Competency: Remove trees

Competency Builders:
Fell trees
Prepare area for safety
Prepare drop area
Select proper equipment
Apply safety procedures
Make primary notch cut
Make final cut
Buck limbs
Demonstrate ropes/knots/rigging
BIL: Essential
Not applicable for NT

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Competency: Repair mature plant material

Competency Builders:
Support limbs
Brace limbs
Clean cavities and splits
Treat cavities and splits
BIL: Essential
Not applicable for NT

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Competency: Describe the arborist's legal responsibilities

Competency Builders:
Explain pesticide liability
Explain property liability
Unit: Landscape Construction

BIL: Essential

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Competency: Install the project landscape

Competency Builders:
- Locate existing utilities
- Rough grade the site
- Outline procedures for installing large materials
- Install irrigation system
- Describe procedures for constructing hardscape (e.g., walls, walks, patio, drives)
- Lay out plants
- Install plants (i.e., remove labels, fertilizer application)
- Prepare final grade
- Install lawns and turfs
- Install mulch
- Water as required
- Perform final cleanup (tool search)
Competency: **Install a drainage system**

**Competency Builders:**
- Identify the natural slope/grade of an area
- Identify the texture and percolation characteristics of the soil
- Identify techniques for constructing ditches and culverts
- Direct the movement of water away from structures and installations
- Plan the construction of an underground drainage system
- Order appropriate fill materials
- Identify proper elevations for a landscape site
- Grade a landscape site
- Read soils and contour maps
Competency: Install an irrigation system

Competency Builders:
Identify irrigation requirements
Assess quality of irrigation water
Plan an irrigation system
Supervise the installation of irrigation equipment
Service electric and engine driven pumps
Operate a low-volume irrigation system
Operate an overhead irrigation system
Operate an automatic irrigation system
Calculate cost efficiency of an irrigation system
BIL: Recommended

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Competency: Construct with concrete

Competency Builders:
- Follow general safety precautions
- Select hand concrete tools
- Use hand concrete tools
- Excavate structure sites for concrete pouring
- Install concrete reinforcement
- Build concrete forms
- Remove concrete forms
- Mix and pour concrete
- Cure concrete
- Use survey level
- Select concrete materials and additives
- Calculate volume of concrete to order or mix
- Finish concrete surface
- Lay block
- Lay brick
- Install concrete edging
- Use power concrete tools
BIL: Essential

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Competency: Construct with stone and pavers

Competency Builders:
Follow general safety precautions
Excavate for foundation
Apply aggregates
Compact aggregates
Grade sand using screen
Install edging
Lay pavers
Lay gravel
Select stone
Face stone
Set landscape stones
Lay stone
Construct wall
Operate cutting saws/tools
Install drainage behind walls
Competency: Construct with wood

Competency Builders:
Follow general safety precautions
Cut lumber to dimension
Cut and fit joints
Select and use metal fasteners
Assemble joints with glue
Cut and set timber and poles
Install bracing
Repair bracing
Install siding
Repair siding
Select types of wood
Identify use of recycled materials
**BIL:** Recommended

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**Competency:** Plan electrical installations

**Competency Builders:**
- Follow general safety precautions
- Follow electrical codes
- Identify electrical needs
- Plan distribution system
- Plan wiring layouts
- Select wire and electrical supplies
- Identify alternative electrical sources
BIL: Essential

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Competency: Maintain electrical systems

**Competency Builders:**
- Follow general safety precautions
- Repair extension cords
- Install low-voltage lighting fixtures
- Replace or reset circuit breakers and fuses
- Install outlets and switches
- Install electric motors
- Repair outdoor wiring
- Splice outdoor wiring
- Lubricate motors
- Install computerized components
BIL: Essential

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Competency: Maintain fencing

Competency Builders:
Follow general safety precautions
Lay out fence
Install posts and braces
Install fasteners
Identify options in fencing systems
Identify amount of fence required
Select fencing materials
Select posts and braces
Select fasteners
Install gates
Identify use of recycled materials (e.g., plastics)
**Unit:** Golf Course Operations

**BIL:** Essential

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**Competency:** Differentiate golf course types

**Competency Builders:**
- Classify golf courses by ownership
- Classify golf courses by clientele
- Classify golf courses by length and layout
- Classify golf courses by management structure
Competency: Demonstrate knowledge of golf course design and construction

Competency Builders:
Identify objective of the construction
Explain cost analysis and financing
Explain the role of the architect
Describe form and function of features
Relate golf course design to length, difficulty of play, flexibility, speed of play, ease of maintenance, safety, use of land
Demonstrate knowledge of installation, irrigation, and drainage
Demonstrate turfgrass establishment
Describe putting green construction according to USGA specifications
Compare other means of putting green construction
Describe water hazards
Describe bunker construction
Describe lateral water hazards
Describe cart path construction
Explain the length of golf holes and golf courses
Explain the rating of golf holes by par
Competency: Explain chemical programming

Competency Builders:
Describe fertilizer and pest control programs
Describe reasons for product selection
Explain purchasing
Use application equipment
BIL: Essential

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Competency: Demonstrate knowledge of capital equipment

Competency Builders:
Define inventory, valuation, and depreciation
Identify items needing replacement
Select appropriate equipment
Explain purchasing vs. renting or leasing
Explain how budgets cover capital items
Explain importance of preventative maintenance
BIL: Essential

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Competency: Prepare annual budget

Competency Builders:
Collect information
Interpret last year's records
Put budget on paper
Sell the budget
Follow the budget
Competency: Irrigate plants and turfs

Competency Builders:
- Identify water needs of plants
- Identify irrigation components and types of systems
- Identify sources of water for irrigation
- Install irrigation systems with control valves and clocks
- Identify drainage components for different types of drainage systems
- Install drainage systems
- Repair irrigation systems
- Identify soil structures to determine proper irrigation and drainage systems (e.g., topsoil, subsoil)
BIL: Essential

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Competency: Explain the ground rules of golf course maintenance

**Competency Builders:**
- Describe the marking of the course (e.g., lengths, out-of-bounds, hazards, grounds under repair)
- Demonstrate the setting of cups and tees
- Identify appropriate mowing heights
- Demonstrate bunker maintenance
- Explain the special needs associated with tournaments, outings, and contests
- Explain rules of golf
Unit: Turfgrass Management for Golf Courses

BIL: Essential

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Competency: Establish golf course turf

Competency Builders:
Select proper turfgrass species and cultivar for various locations (e.g., cool vs. warm season, greens, tees, fairways, roughs, maintenance budget, availability, species and cultivar features)
Acquire materials
Measure site area
Determine material application rate
Calculate amount of material needed
Explain interseeding and overseeding
Prepare the site
Clear the site
Rough grade the site
Contour the site
Fertilize the site
Plant turf (e.g., seeding, sodding, plugging)
Calibrate application equipment
Demonstrate sprigging, seeding, sodding, and plugging
Competency: Mow golf course turf

Competency Builders:
Explain mowing needs of turf
Explain differences and pros and cons of reel mowers vs. rotary mowers
Demonstrate rotary mower operation and adjustment
Demonstrate reel mower operation and adjustment
Develop a golf course mowing schedule, given equipment and manpower resources and hours of operation
Maintain reels
**BIL:** Essential

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**Competency:** Irrigate golf course turf

**Competency Builders:**
- Explain turfgrass water needs
- Program sprinkler controller to achieve turfgrass water needs
- Demonstrate hand watering of turf
- Determine need for irrigation by observing turf and soil
BIL: Essential

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Competency: Fertilize golf course turf

Competency Builders:
- Demonstrate sampling for a soil test
- Evaluate soil test results
- Explain types of fertilizers and their composition
- Develop a fertilization plan, given performance needs
- Develop a fertilization plan, given budget
- Develop a fertilization plan, given type of turfgrass variety
- Calibrate fertilization equipment
- Apply fertilizer to turf areas
BIL: Essential

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Competency: Demonstrate types of turfgrass cultivation

Competency Builders:
Demonstrate aerification
Explain pros and cons of hollow tine aerification
Explain pros and cons of solid tine aerification
Demonstrate high pressure water aerification
Explain pros and cons of high pressure water aerification
Demonstrate spiking/slicing
Explain pros and cons of spiking/slicing
Demonstrate deep tine aerification (Vertidrain)
Explain pros and cons of deep tine aerification (Vertidrain)
Demonstrate vertical mowing
Explain pros and cons of vertical mowing
Demonstrate grooming
Explain pros and cons of grooming
Demonstrate rolling
Explain pros and cons of rolling
List methods for topdressing
List advantages to different methods for topdressing
Demonstrate topdressing
Explain pros and cons of topdressing
Demonstrate brushing
Explain pros and cons of brushing
BIL: Essential

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Competency: Control pests

Competency Builders:
Identify common turfgrass insect pests and their damage
Explain cultural control methods of common turfgrass insect pests and their damage
List common chemical control for common turfgrass insect pests and their damage
Identify common turfgrass disease pests and their damage
Explain cultural control methods for common turfgrass disease pests and their damage
List common chemical controls for common turfgrass disease pests and their damage
Apply fundamentals of IPM
Identify common turfgrass weed pests
Explain cultural control methods of common turfgrass weed pests
List common chemical controls for common turfgrass weed pests
Unit: Nursery Operations

BIL: Essential

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Competency: Propagate nursery stock

Competency Builders:
Collect propagation materials (e.g., seeds, cuttings, scions, bulbs) at proper time
Demonstrate propagation by grafting, budding, layering, separating, dividing, cutting, and tissue culturing
Prepare flats and a seedbed
Plant seeds
Prepare a rooting bed
Prepare propagation materials (e.g., seeds, cuttings, scions) for planting
Apply growth stimulants to propagation materials
Control propagation facility environment (e.g., moisture, temperature, light, pH and fertilization of field grown material)
Transplant rooted propagation materials, including tissue culture transplants
Demonstrate sanitation and safety practices
BIL: Essential

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Competency: Market nursery stock

Competency Builders:
Label plants for sale
Maintain clean and attractive merchandising and display areas
Use various advertising methods to promote sales
Take telephone orders
Use sales catalog
Greet customers
Describe care and use of plants to customers
**BIL:** Essential

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**Competency:** Perform field and container planting and maintenance

**Competency Builders:**
- Manage material in cold storage
- Use cover crops
- Describe elements of soil preparation in the field (e.g., drainage, pH, nutrient levels)
- Design field layout and spacing, including irrigation systems and erosion control
- Maintain field nursery (e.g., mowing, weed control, pruning, spraying, fertilizing)
- Demonstrate sanitation and safety practices
- Prune nursery stock
- Shape nursery stock
- Prune plants to achieve desired growth
- Select chemical growth regulators
- Use chemical growth regulators
- Root-prune nursery plants and trees
- Identify techniques for pruning specialty items (e.g., topiary, espalier, bonsai)
BIL: Essential

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Competency: Perform field harvesting

Competency Builders:
Use specialized digging equipment
Perform hand digging, ball and burlap
Perform bare root digging
Determine care of ball and burlap and bare root plants before planting
Identify proper loading and shipping techniques
BIL: Essential

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Competency: Demonstrate agronomy knowledge

Competency Builders:
Identify soil types and the properties of each
Explain soil amendments and how they are used (e.g., peat, sand, clay, compost)
Demonstrate how irrigation and drainage systems affect soil and plant health
BIL: Essential

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Competency: Irrigate plants

Competency Builders:
Identify various types of irrigation components and systems
Use various types of irrigation components and systems
Set up irrigation system for propagation area
Set up irrigation system for greenhouse or enclosed structure
Set up irrigation system for shadehouse
Set up irrigation system for retail display area
Set up irrigation system for field growing area
BIL: Essential

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Competency: Prepare growing media and seeds

Competency Builders:
- Prepare rooting and growing media according to plant requirements
- Sterilize rooting, potting, and growing media
- Collect and test a soil sample from field and potting media
- Adjust pH and nutritional levels of media
- Prepare planting beds and sites
- Fill benches and pots with media
- Level benches and pots with media
- Demonstrate sanitation practices when handling and storing plant media materials
- Construct drainage ditches in field growing area
- Repair drainage ditches in field growing area
BIL: Essential

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Competency: Propagate plant materials

Competency Builders:
Collect propagation materials (e.g., seeds, cuttings, scions, bulbs) at proper time
Demonstrate propagation by grafting, budding, separating, dividing, cutting
Explain layering and tissue culture
Prepare flats and seedbeds
Plant seeds
Prepare a rooting bed
Prepare propagation materials (e.g., seeds, cuttings) for planting
Apply growth stimulants to propagation materials
Control propagation facility environment (e.g., moisture, temperature, light)
Transplant rooted propagation materials, including tissue culture transplants
Demonstrate sanitation and safety practices when propagating
Identify proper tools and their maintenance (e.g., sterilization)
BIL: Essential

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Competency: Control plant growth by cultural, environmental, and chemical methods

Competency Builders:
- Disbud flowering plants
- Apply growth-regulating chemicals
- Apply shading compound to greenhouse structure
- Prune plants to achieve desired growth
BIL: Essential

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Competency: Irrigate plants

Competency Builders:
Identify water needs of plants
Identify irrigation components and types of systems
Identify sources of water for irrigation
Install irrigation systems with control valves and clocks
Repair irrigation systems
Identify soil structures to determine proper irrigation and drainage systems (e.g., topsoil, subsoil)
Unit: Floral Design

BIL: Essential

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Competency: Explain the use of value as it relates to floral design

Competency Builders:
Describe the number of flowers used in a $25.00 arrangement
Explain the concept of over-stuffing an arrangement and the consequence to the business
Describe how to arrive at proper value for an arrangement
**BIL:**  Recommended

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**Competency:**  Explain the use of color as it relates to floral design

**Competency Builders:**
Describe monochromatic color as it relates to floral design
Describe analogous color as it relates to floral design
Describe complementary and split complementary as it relates to floral design
Describe triadic color scheme as it relates to floral design
Describe color as it relates to interior design (e.g., floral shop, customers' homes, and businesses)
Mix colors (e.g., to create a color to match an accessory)
Describe colors to go with situations (e.g., baby boy - blue, baby girl - pink)
Describe color principles and use of color wheel
Competency: Demonstrate care and handling of flowers and greens

Competency Builders:
Follow general safety precautions
Explain importance of bucket and tool cleanliness and disinfection
Identify temperature needs
Use proper cutting technique
Mix preservatives and treatments
Strip foliage
Separate flower varieties and color
Identify ethylene sources (e.g., fruits)
Identify preservatives and treatments
Select preservatives and treatments
Identify major cut flowers and decorative foliage
Explain the correct procedure for unpacking and storing cut flowers
Differentiate non-saleable and healthy flowers
**BIL:** Essential

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**Competency:** Process potted plants, planters, and dish gardens

**Competency Builders:**
- Follow general safety precautions
- Identify foliage and blooming plants for specific plant needs (e.g., light, water, and temperature)
- Clean plants and containers
- Trim plants
- Decorate plants and containers
- Attach care instructions
- Attach price tags and Universal Product Codes (UPC's)
- Explain the correct procedure for handling potted plants in the flower shop
- Decorate and package a potted flowering plant for sale
- Identify plant pests and/or diseases
- Decorate with fresh/dried flowers
BIL: Essential

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**Competency:** Construct floral arrangements

**Competency Builders:**
Identify flowers and foliage
Identify arrangement style for occasion
Select flowers, foliage, and containers for specific tasks
Construct asymmetrical arrangements
Construct round arrangements
Construct oblong arrangements
Construct vertical arrangements
Construct horizontal arrangements
Construct triangular arrangements
Apply color principles
Apply principles and elements of design
Identify design variations
Identify principles of design
Identify principles of efficient production of multiple pieces
Construct bud vases
Construct handheld bouquets (e.g., hand-ties, presentation bouquets)
Use silk and dry materials
Arrange fruit baskets
Construct sympathy arrangements
Construct party arrangements
Construct wedding arrangements
Construct contemporary arrangements (e.g., free form, vegetative, parallel, etc.)
BIL: Essential

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Competency: Prepare materials for arrangements

Competency Builders:
- Identify flowers/foliage
- Wire and tape materials
- Select and prepare accessories
- Make bows
- Prepare containers using proper mechanics (e.g., oasis, Sahara, tape, chicken wire, styrofoam, etc.)
- Use tulle, ribbon, netting, and lace as needed
- Spray/tint dried and live floral products as needed
- Explain the proper use of various floral containers and bases
- Explain sizes and use of florist wire
- Explain sizes, grades, and uses of floral ribbon and netting
- Explain use of various mechanical aids used in floral design
BIL: Essential

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Competency: Design dish gardens (planters)

Competency Builders:
- Follow general safety precautions
- Select plant containers
- Arrange plants in a container
- Fill containers with soil
- Identify foliage and blooming plants
- Select plants that are environmentally compatible
- Prepare planters for sale (e.g., cleaning plant and container, and watering)
- Design custom dish gardens
- Trim with fresh or dried flowers and/or ribbons
BIL: Recommended

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Competency: Prepare wedding flowers

Competency Builders:
- Identify proper flower/foliage
- Follow wedding form instructions (e.g., proper bouquet knowledge and flower/foliage knowledge)
- Construct novelty type bouquets
- Construct colonial/nosegay bouquets
- Construct arm-style bouquets
- Construct assorted cascade bouquets
- Construct traditional bouquets
- Construct wedding boutonnieres and corsages
- Construct rehearsal dinner, wedding and reception decorations
- Set up rehearsal dinner, wedding and reception decorations
- Dismantle wedding decorations
- Service wedding
- Perform maintenance of rental decorations
- Assist with design of custom wedding flowers
BIL:  Recommended

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Competency:  Prepare sympathy flowers

Competency Builders:
Take specialty orders
Explain styles of sympathy arrangements
Identify proper flowers/foliage for style chosen
Identify funeral home procedures
Construct mechanics for assorted funeral pieces
Construct assorted casket pieces
Construct easel/standing sprays or wreaths
Construct vases
Construct pillows
Assist with design of custom sympathy flowers
BIL: Essential

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Competency: Maintain floral shop equipment and facilities

Competency Builders:
Follow general safety precautions
Use assorted floral cleaning supplies (e.g., bucket cleaner)
Clean display coolers
Clean storage containers and floral buckets
Perform general cleaning of showroom, work room, etc.
Maintain sidewalks and parking area (e.g., snow and ice removal)
Sharpen cutting tools
Lubricate cutting tools
Take an inventory
BIL: Essential

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Competency: Deliver merchandise

Competency Builders:
- Follow general safety precautions
- Read an order correctly
- Load floral arrangements properly
- Outline delivery route
- Maintain company image (e.g., personal appearance and ability to present themselves in a professional manner)
- Unload merchandise
- Maintain a good driving record and a driver's license
- Read a road map
- Describe proper weather protection of floral arrangements
- Describe proper procedure to follow for non-deliverable arrangements
BIL: Essential

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Competency: Prepare silk/dry arrangements

Competency Builders:
Prepare mechanics/container
Use equipment properly (e.g., Pik machine, glue gun, hot melt/pan glue, cool melt, wire cutters, etc.)
Design custom silk/dry arrangements
BIL: Essential

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Competency: Prepare flowers to wear

Competency Builders:
Wire and tape flowers and foliage efficiently
Use floral glues and adhesives to construct or enhance flowers to wear
Make bows
Construct boutonnieres
Construct shoulder corsages
Construct wristlets
Construct fashion flowers (e.g., hat, purse, or shoe decorations)
Construct hair flowers
Package corsages and boutonnieres
Design custom flowers to coordinate with clothing
BIL: Recommended

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Competency: Take general customer's orders

Competency Builders:
Take an order over the phone and in person
Interpret an order form
Take proper information needed for a specific order
Describe various types of floral industry wire services and the proper way to place and receive orders
Apply basic computer skills in using a wire service computer
Unit: Soil Science and Management

BIL: Essential

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Competency: Explain the importance of soil

Competency Builders:
Describe soil as a life supporting layer of material
Describe soil as a medium for plant growth
Identify agricultural uses of soil
Identify nonagricultural uses of soil
Describe land use in the U.S.
Competency: Describe the geology of soil

Competency Builders:
- Identify the four major layers of the earth
- Identify soil components
- Define parent material
- Differentiate among the major types of parent material
- Describe the role of climate, organisms, and plants in soil formation
- Describe the role of topography in soil formation
- List the forms of plant life found in poor soil conditions
- Define soil profile
- Identify the soil horizons in a soil profile
- Differentiate between surface soil and subsoil
Competency: Describe composition of soil

Competency Builders:
- List the main components found in a normal soil
- Explain the composition of the solid part of the soil
- Describe the main sources of organic matter
- List the approximate percentage in which each of the soil properties is found in a normal soil
- Differentiate between soil low in organic matter and soil high in organic matter
- Explain the value of each soil component with regard to proper growth of plants
BIL: Essential

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Competency: Identify physical properties of soil

Competency Builders:
- Define soil texture
- Define soil density and permeability
- Describe soil structure
- Define soil consistence
- Define soil tilth
- Describe the role of soil temperature
- Explain the significance of soil color
- Interpret the organic matter content of the surface soil using soil color
- Interpret internal drainage of the subsoil by observing soil color
- Differentiate between "light" and "heavy" soils
- Determine the texture of a soil sample
- Classify soil samples using the textural triangle as a guide
- Explain the effects of soil structure on productivity
- Explain why dark color is not always due to organic matter content
- Explain the effects of organic matter on soil structure
- Describe the effects of soil structure on infiltration, percolation, and the potential for ground water contamination
- Explain how soil type affects crop identification
- Compare root restricting boundaries (e.g., plow pan, fragipan, etc.)
- Describe factors that contribute to the formation of tillage or traffic pans
- Describe methods for alleviating traffic pans (e.g., subsoiling, reduced tillage, no-till)
Competency: Describe the biological properties of soil

Competency Builders:
List the biological properties of soils
Explain how biological properties affect the nature and conditions of the soil
Identify the microorganisms that are found in the soil
List the soil microorganisms that are found in the soil
List the soil microorganisms that are beneficial to farmers
Describe the role of higher forms of plant and animal life in the soil
Explain the nitrogen and phosphorus cycle
Explain where the energy comes from to carry out the nitrogen transformations
Identify common bacteria in the nitrogen cycle
Explain the symbiotic relationship between bacteria and plants
Specify where bacteria are located in the roots of the plants
Explain nitrogen fixation
Identify the roles of different types of bacteria in nitrogen fixation
Describe the concept of mineralization and immobilization of plant nutrients by soil microorganisms
Explain the biological effects on soils when amended with fertilizers, pesticides, and recyclable materials such as municipal wastes
Describe the effects of poor drainage or waterlogging on soil properties and plant growth
Competency: Describe the chemical properties of soil

Competency Builders:
List the chemical properties of soil
Explain how chemical properties affect the biological properties of soil and the nature and conditions of the soil
Explain the effect of cation-exchange capacity on plant production
Explain the chemical effects on soil when amended with fertilizers, pesticides and recyclable materials such as municipal wastes
Describe the effect of sand, silt and clay content on water and nutrient holding ability of soil (CEC)
Explain how charges on clay particles affect nutrient retention
Compare different types of clay to soil nutrient availability
Competency: Define soil acidity and alkalinity

Competency Builders:
Define pH
Create a chart of the pH scale to show degrees of soil acidity and alkalinity
Conduct laboratory tests for acidity of common products (e.g., fresh milk, sour milk, orange juice, and lemon juice)
Explain how calcium affects soil acidity and the availability of other elements
Explain how pH symbols are used in denoting the degree of acidity and alkalinity in soils
Describe the conditions that lead to soil acidity or alkalinity
List the optimum soil pH range for the major crops
Explain how soil acidity or basicity is corrected
Explain how soil pH affects the availability of nutrients
BIL: Essential

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Competency: Demonstrate knowledge of soil water

Competency Builders:
- Define gravitational, capillary and hygroscopic water
- Demonstrate the water holding capacities of sandy and clay soils
- Determine soil water availability
- List ways available water can be lost by soils
- Identify the important factors in determining water movement in the soil
- Explain the main purpose of water conservation
- Explain how strip cropping can contribute to the conservation of soil water
- Describe two types of mulch
- Explain how production techniques influence the efficiency with which water is utilized by plants
- Explain water holding capacity and how to determine field soil moisture
- Explain the effect of texture and structure on field capacity
- Describe responsibilities to groundwater quality
- Describe the plant, soil, and environmental factors that influence crop responses to irrigation
- List several devices or methods used to schedule irrigation to conserve water and maximize crop yields
Competency: Explain liming to correct soil acidity

Competency Builders:
List the benefits obtained from liming a soil
List the steps involved in liming acid soils used for growing plants
Explain how lime reduces soil acidity
Explain how to determine the lime requirements for a specific crop
Identify different kinds of lime materials
Describe the appearance of plants growing in soils of different pH levels
List some sources of commercial lime
Describe different methods of applying lime and the type of equipment used
Formulate a liming schedule for various crops
Explain the effect of soil acidity on soil structure, water infiltration and soil aggregation
List some problems and effects associated with over-liming soil
Explain how lime particle size affects its ability to reduce soil acidity
List several materials that can be used to increase soil acidity or lower pH
Define dolomite limestone and calcitic limestone
BIL: Essential

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Competency: Test soil samples to determine characteristics

Competency Builders:
Collect soil samples from test area
Complete soil data forms
Record texture, structure, temperature and color of each soil layer
Analyze soil data
Write report
Competency: Test plant tissue samples

Competency Builders:
Take plant tissue samples
Submit prepared plant tissue samples and forms to analysis laboratory
Interpret results of plant analysis
BIL: Essential

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Competency: Test water samples

Competency Builders:
Take water samples
Submit water samples to analysis laboratory
Interpret results of water test
BIL: Essential

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Competency: Manage soil

**Competency Builders:**
- Evaluate soil drainage
- Identify soil texture and percent organic matter
- Identify soil structure and type
- Determine slope
- Determine soil-use capability for agriculture
- Determine suitability of soil for nonagricultural uses
- Evaluate problems affecting soil use and management
- Determine management and conservation practices
- Implement management and conservation practices
- Comply with government regulations and guidelines
Competency: Practice soil conservation

Competency Builders:
Define various types of erosion
Explain how water erosion occurs
Identify methods of predicting soil loss
Demonstrate use of the Universal Soil Loss Equation
Describe ways of controlling water erosion
Describe wind erosion and its effects
BIL: Essential

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Competency: Demonstrate knowledge of irrigation and drainage

Competency Builders:
- Explain the importance of drainage
- Define wetlands and wet soils
- Describe methods of artificial drainage
- Identify types of irrigation systems
- Describe the use of irrigation
- Analyze water quality
Unit: Environmental Science and Ethics

BIL: Recommended

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Competency: Explain the relationship between plants and animals within ecosystems

Competency Builders:
- Classify the major categories of organisms
- Differentiate among biomes
- Differentiate among types of ecosystems
- Explain the dynamic nature of ecosystems
- Define habitat and its importance to natural systems
- Identify the functions of producers and consumers
- Explain how biotic and abiotic factors affect producers and consumers
- Categorize the various forms of animal life
- Describes the interactions between producers, consumers, decomposers, and antagonists
- Illustrate a food chain and food web
BIL: Essential

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Competency: Describe the character and value of natural resources

Competency Builders:
- Describe the value of natural resources
- Describe the major categories of natural resources
- Describe the types and distributions of natural resources
- Contrast the origins of natural resources
- Differentiate between renewable and non-renewable natural resources
BIL: Essential

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Competency: Identify renewable natural resources

Competency Builders:
Define renewable natural resources
Define the major categories of renewable natural resources
Identify the origins of renewable natural resources
Describe the value of renewable natural resources
BIL: Essential

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Competency: Identify non-renewable natural resources

Competency Builders:
- Define non-renewable natural resources
- Define the major categories of non-renewable natural resources
- Identify the origins of non-renewable natural resources
- Describe the value of non-renewable natural resources
BIL: Recommended

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Competency: Evaluate the exploitation of natural resources

Competency Builders:
Describe natural events that altered the environment
Describe various methods used to obtain natural resources
Describe effects of obtaining natural resources on the environment
Identify the primary factor for the exploitation of natural resources
Identify the technological advances contributing to the exploitation of natural resources by industry
Identify the technological advances contributing to the exploitation of natural resources by agriculture
Identify the transportation advances contributing to the exploitation of natural resources
BIL: Recommended

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Competency: Describe the impact of an increasing human population on the environment

Competency Builders:
Define doubling time, natural increase, natural decrease, rate of population change, and zero population growth
Interpret a population profile
Identify the results of the increases in the population on the environment
Competency: Explain the consequences of resource use and abuse on the environment

Competency Builders:
Trace the effects of pollution through a food chain
Differentiate between biodegradable and non biodegradable products
Differentiate between organic farming and farming practices that incorporate the use of biocides and inorganic fertilizers and their comparative effects on the environment
Describe solid-waste disposal methods and groundwater contamination
Identify several causes for the reduction of habitat
Differentiate among the various types of habitat
Explain why preservation of habitat is essential
Define threatened, endangered, introduced and extinct as applied to both plant and animal species
List examples of threatened, endangered, introduced and extinct plant and animal species
Cite causes for the decrease of both plant and animal species
Explain the circumstances contributing to accidental, incidental, and deliberate resource abuse
Identify the results of overuse that occurred from exploitation
Competency: Identify the impact of individuals/organizations on the development of environmental policies and issues

Competency Builders:
List prominent individuals/organizations involved with environmental issues
Explain current trends in property rights and compensation
Identify the major issues addressed by environmental organizations
Identify major incidents that have resulted in legislation
Match major events in restoration and/or conservation activities to the individuals/organizations responsible
Evaluate results of environmental restoration and conservation efforts
Identify pros and cons of environmental organizations
BIL:  Recommended

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Competency: Evaluate the effects of research and education on environmental issues

Competency Builders:
Identify the methods of research used by both public and private agencies in restoration and conservation efforts
Identify the process used in restoration and conservation research
Explain the interrelationship between research and education
Evaluate the outcome of environmental research projects
BIL:     Recommended

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Competency:     Explain government's role in environmental restoration and conservation

Competency Builders:
Describe the effects legislation has had on the environment
Identify federal and state agencies and their roles in restoration and conservation
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Competency: Describe the impact and implications of environmental restoration

Competency Builders:
- Explain the importance of environmental restoration
- Cite examples of various levels of environmental restoration
- Identify the results of restoration efforts
- Describe economic issues of restoration projects
- Identify non-economic benefits of restoration activities
Competency: Describe the impact and implications of resource conservation

Competency Builders:
- Explain the importance of resource conservation
- Cite examples of various levels of resource conservation
- Identify the results of conservation efforts
- Describe economic issues of conservation efforts
- Identify non-economic benefits of conservation activities
BIL: Recommended

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Competency: Describe the impact and implications of environmental preservation

Competency Builders:
- Explain the importance of environmental preservation
- Cite examples of environmental preservation
- Identify the results of preservation efforts
- Describe economic issues of preservation efforts
- Identify non-economic benefits of preservation activities
Identification of the environmental ethical issues in agriculture

Competency Builders:
- Define organic agriculture
- Explain the environmental issues regarding the use of genetically engineered plants in agriculture
- Identify agricultural methods/practices that reduce negative effects on the environment
BIL: Essential

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Competency: Identify the role of responsible stewardship in maintaining a healthy environment

Competency Builders:
- Define responsible stewardship
- Explain the need for responsible stewardship and environmental accountability
- Identify types of environmental accountability
- Cite examples of each type of environmental accountability
- Cite results stemming from responsible stewardship
Unit: Crop Pest Identification and Management

BIL: Essential

Competency: Identify pests

Competency Builders:
- Explain why identification of the pest is the first step in developing an effective pest control strategy
- Define what a pest is
- Identify common plant pests and their damages
- Explain differences between continuous pests, sporadic pests, and potential pests
- Identify fungi and bacteria and their symptoms
- Identify symptoms of insects and nematodes
- Classify feeding habits and life cycles of insects
- Describe life cycles of bacteria and fungi
- Identify noxious weeds and vines of crops and specialty plants
- Identify insects, diseases, and other pathogens of crops and specialty plants
BIL: Essential

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Competency: Determine when pest control is needed

Competency Builders:
Identify pest
Determine pest control goal (e.g., prevention, suppression, eradication)
Determine acceptable threshold level of pests
BIL: Essential

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Competency: Explain Integrated Pest Management (IPM)

Competency Builders:
- Explain the theory of Integrated Pest Management
- Explain natural controls (e.g., climate, natural enemies, geographic barriers, food and water supplies, shelter)
- Explain applied controls (e.g., host resistance, biological control, cultural control, mechanical control, sanitation, and chemical control)
BIL: Essential

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Competency: Plan an Integrated Pest Management control program

Competency Builders:
Follow general safety precautions
Identify insects, diseases, weeds, and vertebrate pests
Identify pest damage
Calculate area to be covered
Complete certification requirements for prescribed chemical application
Evaluate chemical/cultural/biological control options
Interpret chemical labels and compatibility charts
Identify appropriate control methods
Identify disease-resistant and insect-resistant species
Estimate pest population numbers
Assess degree of damage
Outline when controls are needed
Recognize environmental limitations
Select control option
Take pesticide applicator test
Compute treatment cost
Document chemical application, methods, and results
Competency: Interpret pesticide labeling

Competency Builders:
- Explain pesticide registration including Environmental Protection Agency (EPA), special local needs, and emergency exemptions
- Explain “restricted-use pesticide”
- Identify certification requirements for use of restricted-use pesticides
- Interpret restricted use designation on labels
- Interpret ingredient statement on pesticide labels
- Interpret identifying information on pesticide labels (e.g., brand name, registration number, establishment number, manufacturer, net contents, type of pesticide, type of formulation)
- Interpret precautionary statements (e.g., signal words, symbols, first-aid measures)
- Interpret hazard warnings (e.g., acute effects, delayed effects, allergic effects, personal protective equipment required, environmental hazards, physical hazards, and chemical hazards)
- Interpret “Directions for use” requirements
- Explain importance of following “Directions for use”
- Interpret entry statements
- Interpret storage and disposal requirements
- Explain legal requirements of following label instructions
BIL: Essential

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Competency: Demonstrate knowledge of pesticide formulations

Competency Builders:
Explain what a pesticide formulation is
Explain the difference between active ingredients and inert ingredients
Identify the factors to consider when choosing a formulation
Identify the characteristics, advantages, and disadvantages of different types of pesticide formulations
Explain the purpose of adjuvants
List several types of adjuvants
Explain compatibility of pesticides
Competency: Explain how pesticides can affect the environment

Competency Builders:
- Explain the meaning of the word environment
- Distinguish between point-sources and non-point-sources of environmental contamination by pesticides
- List ways that careless pesticide handling can lead to point-source pollution
- List the environmental factors that should be considered when a pesticide is accidentally or intentionally released into the environment
- Gives examples of sensitive areas
- Describe factors that influence whether pesticides will move off site in the air
- Describe factors that influence whether pesticides will move off site in the water
- Describe ways pesticides move off site in or on objects, plants, or animals
- Explain how non-target plants and animals can be harmed by a pesticide
- Describe the harmful effects that pesticides can have on surfaces
- Identify pesticide handling activities that pose a threat to groundwater or endangered species
- Explain how pesticide use site determines special actions needed to protect the environment
- Identify factors that determine whether pesticides will reach ground water
- Explain how to prevent pesticides from reaching groundwater
- Explain the importance of the Endangered Species Act when applying pesticides
Competency: Use personal protective equipment when working with pesticides

Competency Builders:
- Explain the concepts of hazard, exposure, and toxicity and how they relate to one another
- Identify the four main ways pesticides can contact the human body
- List the factors that determine how quickly pesticides will be absorbed through the skin
- Explain the main types of acute effects pesticides can cause in humans
- Explain the main types of delayed effects pesticides can cause in humans
- Explain the main types of allergic effects pesticides can cause in humans
- Describe general signs and symptoms of pesticide poisoning and of pesticide irritation
- Describe appropriate first-aid for pesticide exposures
- Describe your legal responsibility for following personal protective equipment requirements in pesticide labeling
- Define chemical resistant
- Identify factors that determine how well coveralls will protect the body
- Explain the importance of wearing chemical-resistant gloves when handling pesticides
- Identify when protective headgear should be worn
- Describe appropriate protective headgear
- Identify appropriate protective eyewear
- Differentiate between dust/mist filtering respirators, vapor-removing respirators, and air-supplying respirators
- Describe the special hazards that fumigants pose
- Use appropriate personal protective equipment when handling or applying pesticides
- Clean personal protective equipment
- Maintain personal protective equipment
BIL: Essential

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Competency: Apply pesticides

Competency Builders:
Complete certification requirements for prescribed chemical application
Select pesticides according to product label
Describe how to protect the water source at the mixing site
Select appropriate site for mixing pesticides
Use appropriate personal protective equipment while mixing or loading pesticides
Explain safe handling of pesticide containers
Determine whether selected pesticides can be safely mixed
Explain closed system mixing and loading
Explain enclosed application systems
Explain when pesticide containment systems are appropriate
List the advantages of pesticide containment systems
Identify which types of pesticides must be diluted before application
Explain how to dilute pesticides
Dilute pesticides
Calculate the correct amount of dilute pesticide mixture for the application
Mix pesticides
Explain safety procedures that should be followed each time a pesticide is applied
Explain the importance of applying the correct amount of pesticide
Describe how to determine correct amount of pesticide to apply
Identify ways that application rates may be stated on product label
Calculate the application rate
Explain the importance of calibrating pesticide application equipment
Calibrate equipment
Explain the importance of rechecking calibration equipment frequently
Apply pesticides
Clean pesticide equipment
Describe what to do with rinsates from equipment cleanup
Describe personal cleanup after pesticide handling
Explain the importance of accurate records of pesticide applications
**BIL:** Essential

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**Competency:** Handle pesticides safely

**Competency Builders:**
- List safety precautions for transporting pesticides in a vehicle
- Describe how to protect pesticide containers during transport
- List actions needed to establish and maintain a safe storage site
- Describe what to do when a pesticide container leaks
- Explain what to do with excess pesticides that are still usable
- List acceptable ways to dispose of pesticide wastes
- Dispose of pesticide containers in compliance with local, state, federal, and EPA regulations
- List ways to avoid the need to dispose of empty pesticide containers
- Identify the three C’s of spill management
- Explain the steps to take in each of the three C’s
- Identify sources of assistance for managing a spill
Unit: Fertilization of Crops

BIL: Essential

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Competency: Practice GPS/GIS technology

Competency Builders:
Practice grid sampling
Interpret sample results
Calculate recommendations
Evaluate yield results
Overlay different surfaces using GPS/GIS
Interpolate differences
Analyze VRT technology
Identify compaction differences
Analyze variable rate planting
Competency: Identify nutrient requirements of plants

Competency Builders:
Identify groups into which nutrient requirements of plants are divided
Describe the interactions of nutrient availability levels on nutrient toxicity and deficiency
Identify toxicity symptoms caused by excessive manganese and aluminum
Identify major sources of N, P, K, S, Ca and Mg in soils
Identify factors that influence the availability of these nutrients in soils
Explain how soil pH affects nutrient availability
Explain how different types of root systems affect plant nutrient uptake
BIL: Essential

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Competency: **Determine fertilization needs**

**Competency Builders:**
- Identify factors influencing fertilizer requirements
- Use results of soil analysis to determine soil nutrient levels
- Identify symptoms of plant nutrient deficiency
- Determine crop nutrient needs
- Determine amounts and kinds of nutrients and lime to apply
- Evaluate effect of leaching on nutrient availability
- Evaluate influence of soil pH on nutrient availability
- Analyze manure-sample information
- Define meaning of NPK and trace elements on fertilizer information
Competency: Differentiate between organic and inorganic fertilizers

Competency Builders:
Identify sources of inorganic fertilizers
Identify sources of organic fertilizers
Identify the main plant nutrients supplied by inorganic and organic fertilizers
Identify multi nutrient fertilizers
Explain how plants obtain carbon, oxygen, hydrogen, nitrogen, phosphorus, and potassium
Differentiate between a fertilizer grade and a fertilizer analysis
Explain the fertilizer ratio of a 5-10-5 grade
Explain where most of the nitrogen in the soil is derived
Describe the advantages and disadvantages of dry versus liquid fertilizer
Explain the advantages of foliar fertilization
Identify the factors that influence the efficiency of applied fertilizer such as leaching or fixation
BIL: Essential

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Competency: Describe the application of fertilizers

Competency Builders:
- Explain the economic factors to consider in buying fertilizers
- Describe the methods of applying solid and liquid fertilizers
- Explain the purpose of the different placements of fertilizer in the soil
- List the ways fertilizer benefits crop production
- Explain how fertilizer applications can decrease crop production
- Identify possible losses of each major nutrient and their influences on quality of water in lakes and streams, groundwater quality, and atmospheric quality
- Practice calibration of equipment in applying fertilizer
- Explain variable rate fertilization using GPS
BIL: Essential

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Competency: Develop fertilization plan

**Competency Builders:**
- Interpret fertilization-rate charts
- Select fertilizer analysis
- Select fertilizer application method
- Estimate costs of lime and fertilizer recommendations
- Develop fertilization schedule
- Determine amount of lime needed to maintain pH levels
- Calculate fertilization rates required for maximum return per dollar
Competency: Fertilize crops

Competency Builders:
Follow general safety precautions
Follow recommended amounts, timing, and placement of fertilizers
Interpret information on a fertilizer label
Mix fertilizer solutions
Calibrate fertilizer application rates
Transfer liquid fertilizer from nurse tank to applicator
Apply fertilizer
Apply fertilizer using computerized, on-the-go method
Recognize signs of fertilizer injury
Identify safety factors involved in handling NH3
Clean fertilizer equipment
Maintain fertilizer equipment
Handle all types of fertilizers
Unit: Crop Production

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Competency: Explain agricultural concepts

Competency Builders:
Differentiate between seed crops and vegetative crops
Describe the life cycle of a crop plant (e.g., from seed to vegetative stage to reproductive stage to seed)
Explain multiple cropping
Define forage
Explain the purpose of cover crops
Identify uses of tillage
Define conventional tillage
Define conservation tillage
Identify differences between conventional and conservation tillage
Describe cropping systems
Describe dryland farming
Describe organic farming
Compare organic farming to standard production systems
Describe hydroponic crop production
Describe permaculture
Explain crop rotation
Identify equipment used for tilling, seeding, cultivating, harvesting, etc.
Explain “fly-safe date”
Explain “Days-to-Maturity” rating system
Explain GDD (Growing Degree Days) maturity rating system
Explain factors to consider when choosing what crop to produce
Explain factors to consider when selecting seed
Describe procedures for harvesting crops
Describe procedures for storing crops
Explain the use of Global Positioning Systems in agriculture
Explain the use of Geographic Information Systems in agriculture

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BIL: Essential

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Competency: Demonstrate a knowledge of crops common to Ohio

Competency Builders:
- Identify small grain crops common to Ohio
- Identify corn crops common to Ohio
- Identify forage crops common to Ohio
- Identify alternative crops common to Ohio
- Identify cover crops common to Ohio
- Describe the economic importance of various crops
- Describe the practices necessary to produce various crops
- Identify the major advantages and disadvantages of various crops
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Competency: Explain plant nutrition as related to crop production

Competency builders:
- Define green manure crops
- Explain the relationship of adequate fertilization to yields
- Explain the relationship of tillering in grain crops
- Explain the relationship of return on investment in crop production
- Describe purpose of inoculation of legume seeds with nitrogen fixing organisms
- Explain minimum, optimum, and luxury consumption of soil nutrients by the plant
- Compare nutrients in the soil versus what plants get from air and water
Competency: Explain plant fertilization as related to crop production

Competency Builders:
Identify deficiencies caused by the lack of the minor elements
Differentiate between organic and inorganic fertilizers
Describe the advantages and disadvantages of organic versus inorganic fertilizers
Identify global uses of inorganic and organic fertilizers
Describe the pollution hazards associated with over fertilization
Describe the latest techniques used to dispense only required amounts of fertilizer for crops
BIL: Essential

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Competency: Identify environmental factors affecting crops

Competency Builders:
List some warm and cool season crops
List optimum growth conditions for different types of plants
Explain how crops may be managed to maximize environmental resources (e.g., establishing crop canopies to intercept 100% of light energy prior to fruiting, planting at a date that ensures sufficient biomass to obtain maximum yield)
Describe the influence of day length on plant growth
Explain how the cycle of the seasons influences plant growth
Identify how planting date, row spacing, and plant population affect crop yield and quality
BIL: Essential

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Competency: Explain weed control of crops

Competency Builders:
List ways weeds spread
List reasons weeds are harmful
List methods of weed control
Explain mode of action of common herbicides
Explain weed resistance to herbicides
Describe possible applications of genetic engineering and gene splicing to weed control
Explain how herbicides kill weeds
Explain why some herbicides are applied before or after a crop is planted
Explain why weed problems depend on when they occur during growing season of crop
Identify the major weed species and options available for controlling each
Competency: Explain moisture control

Competency Builders:
Define irrigation, mulch, organic matter, runoff, seepage, subsoiling, and tillage
List three methods of moisture control
List the cultural practices used in moisture control (i.e., annually and at planting)
Describe importance of internal and external drainage in soils for crop production
Describe importance of irrigation to crops
Describe the methods of irrigation (e.g., drip, furrow, sprinkler, flood)
Explain the hydrologic cycle
Explain how irrigation causes salinity problems
Explain salt water intrusion in irrigation wells
Explain subsidence caused by removal of irrigation water
Describe methods used to reduce irrigation water loss
Explain the use of tensiometers and moisture meters
Explain permaculture
Explain irrigation scheduling
BIL: Essential

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Competency: Test soil and plant tissues

Competency Builders:
Take soil samples
Submit prepared soil samples and forms to analysis laboratory
Take plant tissue samples
Submit prepared plant tissue samples and forms to analysis laboratory
Interpret soil analysis results
Interpret plant analysis results
Monitor nutrient levels with infield equipment
Competency: Determine land class capability

Competency Builders:
Evaluate soil drainage
Identify soil texture and percent organic matter
Identify soil structure and type
Determine slope
Determine soil use capability and suitability
Explain factors to consider when planting on reclaimed land (minesoil)
Follow government regulations and guidelines
Use infrared mapping
BIL: Recommended

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Competency: Practice soil and water conservation

Competency Builders:
- Explain soil and water conservation structures and methods
- Maintain soil and water conservation structures and methods
- Evaluate planting and tilling methods
- Identify government programs
- Follow guidelines of government programs
- Manage residue to reduce erosion
Competency: Develop plan for planting crops

Competency Builders:
Identify a land use plan
Identify long-range conservation practices
Select crop varieties best suited for land, market and type of farm operation
Determine need for companion crop
Recommend crop rotation plan
Identify crop seeds
Interpret seed tag information
Interpret planting charts on seed bag
Calculate number of bushels of seeds needed
Evaluate stand of forage or winter wheat
Select seed
Determine seeding rate
Determine steps to improve stand
Calculate price per pound of pure live seed
Evaluate alternative crops
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**Competency:** Determine procedures needed to manage crops from planting to harvest

**Competency Builders:**
Scout fields
Identify crop problems
Determine cause of crop problems
Develop fertilization plan
Develop plan to control insects and diseases
Develop plan to control weeds
**BIL:** Essential

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**Competency:** Manage crops

**Competency Builders:**
- Fertilize crops
- Control insects and diseases
- Control weeds
- Apply pesticides
BIL: Essential

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Competency: Harvest grain crops

Competency Builders:
- Follow general safety precautions
- Determine crop maturity
- Calculate crop yields
- Estimate harvest loss
- Select equipment to reduce harvest loss
- Operate equipment
- Prioritize harvest areas
- Distribute residue
- Minimize soil compaction
- Evaluate grain quality
BIL: Essential

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Competency: Interpret topographic and soil maps, aerial photographs, and legal descriptions

Competency Builders:
- Interpret legal land descriptions
- Interpret map symbols
- Interpret map legends
- Identify true and magnetic north
- Draw profiles using contour lines
- Demonstrate knowledge of how to operate a computer-aided mapping program
- Complete drawings using a computer-aided mapping system
- Measure distances
- Identify terrain types
- Interpret elevations
- Identify direction of water flow
- Calculate area
- Identify the location of field boundaries
- Establish field boundaries
- Interpret topical and aerial photographs
- Calculate acreage based on field measurements
Unit: Agricultural Business Management and Marketing

BIL: Recommended

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Competency: Identify sources of agricultural information and assistance

Competency Builders:
Maintain a file of current technical information from universities, governmental agencies, and commercial companies
Maintain a reference file for periodicals and other publications
Attend seminars and workshops to update skills and knowledge
Use computer networking for up-to-date agricultural information
Identify associations and societies associated with agricultural professions
Competency: Apply business skills and economic principles to the agricultural industry

Competency Builders:
- Explain the basic economic principles in the agricultural industry
- Explain the importance of local, state, and federal regulations and required documentation affecting the agricultural industry
- Describe the types of agribusiness by organizational structure (e.g., sole proprietorship, partnership, corporation)
- Select computer applications
- Use computer applications
- Analyze data
- Determine the point of maximum profit
- Determine fixed and variable costs of production
- Use the fixed/variable concepts in making business decisions
- Determine the resulting change in price of commodities when shifts in supply and demand take place
- Describe how to manage inventory and determine selling price
- Explain the importance of agribusiness records
- Explain the types of insurance needs of an agricultural business
BIL: Essential

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Competency: Follow legal requirements

Competency Builders:
- Identifies government agencies regulating farm operation
- Comply with employers' and employees' legal responsibilities
- Follow system for government regulation compliance
BIL: Recommended

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Competency: Maintain supplies

Competency Builders:
Set minimum and maximum inventory levels
Conduct physical inventories
Maintain computerized inventory records
Purchase supplies
Compare costs and quality of supplies from different sources
Make maximum use of vendor discounts
Calculate shipping charges
Regulate storage facility environment
Clean storage area
Inspect storage area for damage and hazards
BIL: Essential

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Competency: Demonstrate sales skills

**Competency Builders:**
- Maintain product and service knowledge
- Differentiate between product features and product benefits
- Examine types of selling techniques
- Identify types of customers
- Identify customer buying motives and signals
- Maintain prospective customer relationship
- Follow up purchases and sales
- Develop repeat customer contact list
- Add customer to annual mailings
- Develop a follow-up file
**BIL:** Essential

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**Competency:** Provide technical assistance

**Competency Builders:**
- Provide customer with informative materials
- Interpret product labels
- Demonstrate product use
- Explain safety precautions regarding product use
- Outline extent of product guarantee
- Address customer complaints
BIL: Recommended

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Competency: Demonstrate understanding of marketing principles

Competency Builders:
Define basic marketing terminology (e.g., market, marketing mix, market penetration)
Identify purpose of marketing
Identify marketing activities
Identify elements in the marketing mix (e.g., price, product, promotion, place)
Explain market share
Identify factors that affect market share
Explain margin analysis
Explain market integration
Describe cooperative marketing
Explain methods of pricing farm commodities
Identify governmental regulations affecting the marketing of agricultural products
BIL:  Recommended

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Competency:  Describe marketing strategy

Competency Builders:
Identify marketing strategies for differing products and services
Differentiate between mass-market and market segmentation approaches
Describe the process of identifying a market for a product or service
Describe the role of margin analysis in developing market strategy
Give examples of product positioning
BIL:  Recommended

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Competency:  Demonstrate a basic knowledge of international agricultural trade

**Competency Builders:**
- Identify the major U.S. agricultural export markets
- Identify major U.S. agricultural export crops
- Explain how U.S. agriculture can remain competitive
- Identify factors to consider when deciding whether to enter the export market
- Explain trade barriers, duties, and tariffs
- Identify organizations that can provide assistance in international agricultural trade
- Explain the impact of trade agreements such as NAFTA and GATT on agriculture
BIL: Essential

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Competency: Develop a marketing plan

Competency Builders:
Determine business objectives
Analyze competition
Identify potential buyers
Calculate break even point
Determine pricing goals
Identify factors affecting pricing
Compare pricing strategies
Identify marketing channels
Select marketing channels
Determine most advantageous method of marketing crops
Determine when to market
Identify distribution channels
Develop marketing goals
BIL: Esssential

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Competency: Promote company image

Competency Builders:
- Explain importance of image
- Identify factors affecting image, positive and negative
- Project company image
- Exhibit good personal hygiene
- Perform quality work
- Follow instructions and uniformity
- Keep equipment clean
- Follow dress code
- Handle customer complaints
- Communicate positively with customers
- Read company manual
- Maintain continuity and uniformity of company logo
- Develop customer awareness programs
BIL: Essential

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Competency: Conduct sale

**Competency Builders:**
- Greet customers
- Use appropriate questioning techniques
- Use appropriate selling techniques
- Identify customer needs, problems and recommendations
- Describe services and expectations
- Explain extent of guarantee
- Access support services
- Close sale
- Use good telephone skills
- Compute taxes
BIL: Essential

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Competency: Prepare estimate

Competency Builders:
Calculate square footage and cubic yards
Use price list
Estimate total amount of materials needed
Estimate labor requirements
Estimate fixed costs
Estimate profit and loss margins
BIL: Essential

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Competency: Maintain price lists and catalogs

Competency Builders:
- Compare prices of similar products and services
- Outline material and service availability
- Keep product and service catalogs current
- Keep profit and loss in line
BIL: Recommended

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Competency: Price merchandise

Competency Builders:
- Estimate fixed and variable expenses
- Calculate markup
- Calculate break-even point
- Compare pricing strategies
- Identify factors affecting pricing
- Price merchandise
- Prepare merchandise for inventory or display
- Use computerized pricing system
- Attach price tags
BIL: Recommended

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Competency: Display merchandise

**Competency Builders:**
- Design displays
- Set up displays
- Select items for display
- Use props
- Identify display areas
Unit:  Greenhouse Management

BIL:  Recommended

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Competency:  Test soil, water, and plant tissues

Competency Builders:
Follow general safety precautions
Take soil sample
Prepare soil to be tested
Collect plant tissues to be tested
Determine pH level
Determine soluble salt levels
Take water samples
Interpret results of water test
Interpret results of soil test
Interpret results of plant tissue test
Realize need for professional help
BIL: Essential

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Competency: Prepare media mixes

Competency Builders:
- Follow general safety precautions
- Shred planting media materials
- Mix planting media materials
- Pasteurize media
- Identify media functions
- Identify media components
- List the requirements of a good growing media for potted plants (e.g., pH, porosity)
- Identify the ingredients used to prepare an artificial growing media
- Explain the process of soil pasteurization
- Identify the limitations of the various growing mediums
- Identify the nutrients required for plant growth
- Identify economics of mix-your-own vs. commercial mix (e.g., labor, raw materials, equipment)
BIL: Essential

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Competency: Prepare for propagation

Competency Builders:
- Explain propagation (e.g., sexual, asexual)
- Follow general safety precautions
- Identify tools and equipment used in greenhouse crop propagation
- Explain routine maintenance procedures for greenhouse equipment and facilities (e.g., growth chambers, seeders)
- Describe the propagation requirements for the major floriculture crops produced in the local area
- Identify major bedding, foliage, flowering, and seed stock used for propagation
- List advantages and disadvantages of the different types of greenhouse benches relating to propagation
- Grade cuttings for size
- Interpret seed germination information
- Identify containers
- Identify environmental factors of propagation
- Select media
- Sanitize propagation equipment, areas, and containers
- Identify planting depth
- Identify propagation problems and solutions (e.g., seed sowing, cutting, timing)
- Outline plant scheduling
- Explain economics and quality issue of self-propagation and/or purchasing from reputable source
- Explain seed germination
- Explain use of rooting hormones
Competency: Manage plant production

Competency Builders:
Follow general safety precautions
Demonstrate proper water application
Explain the correct quantity of water to apply
Explain the layout of automatic watering systems
Identify factors that would reduce the quality of water
Select the appropriate container for a particular plant or crop
Explain the purpose of growth regulating chemicals
Outline plant scheduling
Sow seeds
Plant bulbs
Force bulbs
Take cuttings
Label plants and cuttings
Prepare growing media for different types of greenhouse crops and use of soil handling equipment
Transplant seedlings and rooted cuttings
Explain the reasons for pinching, spacing, and disbudding specific greenhouse crops
Describe the types and uses of commonly used automatic greenhouse watering systems
Monitor plant growth (e.g., graphical tracking)
Competency: Fertilize plants in greenhouse operation

Competency Builders:
Follow general safety precautions
Interpret fertilizer bag labels (e.g., micro and macro nutrients)
Mix fertilizer solutions
Apply liquid fertilizer
Apply dry fertilizer
Identify fertilizer injectors
Use fertilizer injectors
Identify fertilization practices and terminology
Identify symptoms of nutrient deficiency
Determine kind of fertilizer to apply
Interpret manufacturer's fertilization rate charts
Calibrate fertilizer application equipment
Calculate the amount of fertilizer needed for an injector stock solution based on the PPM of nitrogen to be applied and the ratio of the injector
Determine fertilizer applications for various crop and plant growth situations
Identify the major nutrient deficiency symptoms
Explain why and when leaching is necessary
BIL: Essential

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Competency: Regulate greenhouse environment

Competency Builders:
Follow general safety precautions
Install shade cloth
Apply glass shading compound
Identify supplemental lighting
Set timers to regulate lighting
Hang lath or saran cloth
Use light meters
Hand irrigate plants
Install irrigation system (e.g., drip, computer irrigation)
Use irrigation system
Identify heating systems (e.g., centralized, localized)
Identify cooling system (e.g., natural ventilation, fan/pad)
Control humidity
Adjust temperatures for plants (e.g., DIF, energy conservation)
Identify carbon dioxide levels
Identify factors influencing plant growth
Identify environmental control system (e.g., computer system)
Explain operation of thermostats and cycle timers
Identify glazing on a greenhouse
Apply mechanical and electrical safety as it applies in greenhouse operation
Control lighting for short and long day sensitive plants
Explain the effects of night and day temperatures on plant growth
Explain light requirements in terms of intensity and duration for plants being grown in a production environment
**BIL:** Recommended

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**Competency:** Compare greenhouse structures

**Competency Builders:**
- Follow general safety precautions
- Identify life expectancy of structure
- Identify space utilization
- Identify types of ventilation systems
- Identify types of structures
- Differentiate among types of greenhouse structures and their layout
- List the requirements necessary for good plant growth
- Explain the use of cold frames and lath houses in conjunction with the greenhouse
- Explain light requirements in terms of intensity and duration for plants being grown in a production environment
- Control lighting for short and long day sensitive plants
- Describe types of heating and cooling systems used in greenhouse production
- Explain the effect of night and day temperatures on plant growth
- Explain how various air quality factors are maintained for good plant growth
BIL: Recommended

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**Competency:** Perform post harvest care

**Competency Builders:**
- Define post harvest care
- Follow general safety precautions
- Explain the procedures involved in planning a greenhouse crop so production will be in line with seasonal demand for the finished product
- Explain how potted plants should be packaged and handled during harvesting and shipment
- Explain care upon receipt of product
- Explain how cut flowers should be handled during harvesting and shipment
- Identify the market possibilities in the local area for a given horticulture crop
- Develop a crop rotation for a year of greenhouse production
- Identify harvest stages
- Cut plants/flowers
- Count and bunch plants/flowers
- Regulate cold storage unit temperature
- Explain plant maintenance to preserve plant viability
- Identify plant life expectancy
- Demonstrate safety practices when harvesting, processing, and shipping plants
- Differentiate between a production greenhouse environment and a maintenance home/office environment
BIL: Recommended

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Competency: Maintain nursery and greenhouse equipment/facilities

Competency Builders:
- Follow general safety precautions
- Clean facility
- Replace or repair plastic covering on greenhouse structure
- Clean heating and cooling systems
- Perform general maintenance by hanging doors
- Perform general maintenance by repairing doors
- Perform general maintenance by replacing windowpanes
- Perform general maintenance by replacing damaged sections of saran or black cloth
- Perform general maintenance by replacing damaged support wires for saran or black cloth
- Perform general maintenance by constructing benches and frames
- Perform general maintenance by repairing benches and frames
- Perform general maintenance by shading greenhouse glass
- Perform general maintenance by lubricating parts
- Perform general maintenance on ventilation systems
- Perform general maintenance by adjusting belts on equipment
- Perform seasonal equipment pre-check (e.g., heating system)
- Inspect assembled equipment for operating defects
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