



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 B Salem Campus
Salem, Ohio

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

Sharon Davis, Floral Design/Greenhouse
Maintenance Instructor, Agriculture
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 B 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

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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.
- building/facility maintenance

- knowledge of game of golf
- 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

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
- 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

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)

G

Horticulture-Agriculture Technologies Tech Prep Competency Profile

Matrix

LD=	Landscape Designer/Manager – Landscape Technician									
GS=	Golf Course Superintendent – Golf Course/Grounds Maintenance Technician									
LC=	Lawn Care Specialist/Technician									
TM=	Tree Maintenance Technician									
NT=	Nursery Technician									
FD=	Floral Designer/Manager									
CA=	Agricultural Custom Applicator									
CC=	Agricultural Crop Consultant									
GT=	Greenhouse Technician/Manager									
Page	Unit	LD	GS	LC	TM	NT	FD	CA	CC	GT
1	Plant Science	X ¹	X	X	X	X		X	X	X
14	Workplace Safety	X	X	X	X	X	X	X	X	X
17	Basic Accounting	X	X	X	X	X	X	X	X	X
19	Daily Management Tasks	X	X	X	X		X	X	X	X
21	Supervision	X	X	X	R ²	R	R			X
25	Sales and Marketing	X		X			X		X	X
35	Horticulture Fundamentals	X	X	X	X	X				X
39	Horticultural Plant Health Care	X	X	X	X	X				X
49	Equipment Maintenance	X	X	X	X	X		X		O
65	Landscape Technology	X	X	X						
70	Turf and Landscape Operations	X	X	X						
80	Nursery Production Management					X				
90	Irrigation	R	X	R		X				X
92	Landscape Design	X	R	R						
115	Drafting Technology	X	R							
121	Computer Aided Design Fundamentals	X								
125	Arboriculture	X	X		X	O ³				
140	Landscape Construction	X	R							
149	Golf Course Operations		X							
156	Turfgrass Management for Golf Courses		X							
162	Nursery Operations					X				
172	Floral Design						X			
186	Soil Science and Management	X	X	X				X	X	R
201	Environmental Science and Ethics	X	X	X	X	X	X	X	X	R
216	Crop Pest Identification and Management							X	X	X
226	Fertilization of Crops							X	X	X
233	Crop Production								X	
248	Agricultural Business Management and Marketing							X	X	X
264	Greenhouse Management									X

¹ X = Unit required

² R = Recommended only

³ O = Some competencies, not applicable

Unit: Plant Science

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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 comrcntiausects oauxinss

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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

Describes 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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	P	R	

Competency: Use arithmetical skills for accounting

Competency Builders:

Compute cash discounts for various terms

Compute extension, sales tax, and totals of sales slips

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
		I	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
		I	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
		I	

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

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	R	

Competency: Display merchandise

Competency Builders:

Design displays

Set up displays

Select items for display

Use props

Identify display areas

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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)

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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 tamps
- 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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

Competency: Maintain application equipment

Competency Builders:

- Follow general safety precautions
- Lubricate spreader
- Dispose of waste safely
- Calibrate spreader
- Clean blade propeller

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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
- Braze metal
- Clean equipment
- Store gas cylinders safely

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P		

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

Competency: Maintain customer relations

Competency Builders:

Conduct walk-through of project with client to assure satisfaction

Identify current and future maintenance requirements

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

Competency: Prepare for planting and propoagation

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

Competency: Prepare planting area

Competency Builders:

Follow general safety precautions

Incorporate soil amendments

Apply soil amendments

Identify surface drainage areas

BIL: Essential

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

Competency: Perform area layout

Competency Builders:

Layout public area

Layout private/outdoor living area

Layout service/utility area

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
		P	

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

EDU:	12	AD	AC
	I	P	

Competency: Plan transport structures

Competency Builders:

Plan walks

Plan driveways

Plan steps

Plan decks and patios

Plan handicap accessibility

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Plan retention structures

Competency Builders:

Plan fences and walls

Plan miscellaneous structures (e.g., gazebos, lawn statuary)

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

Competency: Apply landscape grading techniques

Competency Builders:

Interpret prints and specifications

Locate utilities

Build topographic features

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
		I	

Competency: Apply advanced drafting skills

Competency Builders:

Interpret reports and specifications

Prepare pictorial drawings

Prepare schematics

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Interpret prints

Competency Builders:

Visualize object from drawing

Interpret sectional views

Interpret dimensions

Interpret tolerances

Interpret special symbols

Interpret schematics

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

Competency: Demonstrate dimensioning techniques

Competency Builders:

Construct arrowheads using various styles/discipliens

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

Competency: Describe the arborist's legal responsibilities

Competency Builders:
Explain pesticide liability
Explain property liability

Unit: Landscape Construction

BIL: Essential

EDU:	12	AD	AC
	I	P	

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)

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
		I	

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

EDU:	12	AD	AC
		P	

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

BIL: Essential

EDU:	12	AD	AC
		P	

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

EDU:	12	AD	AC
		I	

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

EDU:	12	AD	AC
		P	

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

EDU:	12	AD	AC
		P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Explain chemical programming

Competency Builders:

Describe fertilizer and pest control programs

Describe reasons for product selection

Explain purchasing

Use application equipment

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

Competency: Prepare annual budget

Competency Builders:

Collect information

Interpret last year's records

Put budget on paper

Sell the budget

Follow the budget

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

Competency: Prepare materials for arrangements

Competency Builders:

Identify flowers/foilage

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

Competency: Prepare wedding flowers

Competency Builders:

Identify proper flower/foilage

Follow wedding form instructions (e.g., proper bouquet knowledge and flower/foilage 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

EDU:	12	AD	AC
	I	P	

Competency: Prepare sympathy flowers

Competency Builders:

- Take specialty orders
- Explain styles of sympathy arrangements
- Identify proper flowers/foilage 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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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.

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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)

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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 ground water 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

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Explain liming to correct soil acidity

Competency Builders:

List the benefits obtained from liming a soil

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

Competency: Test water samples

Competency Builders:

Take water samples

Submit water samples to analysis laboratory

Interpret results of water test

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	R	

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

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
		I	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Recommended

EDU:	12	AD	AC
		I	

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

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
		I	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Identify 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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

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 containers 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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	P	R	

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

BIL: Essential

EDU:	12	AD	AC
	P	R	

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

BIL: Essential

EDU:	12	AD	AC
	P	R	

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

BIL: Essential

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	P	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

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

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	R	

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

BIL: Essential

EDU:	12	AD	AC
	P	R	

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

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

Competency: Manage crops

Competency Builders:

Fertilize crops

Control insects and diseases

Control weeds

Apply pesticides

BIL: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	R	

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 decidi

BIL: Essential

EDU:	12	AD	AC
	I	P	

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: Essential

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	P	R	

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

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	R	

Competency: Display merchandise

Competency Builders:

Design displays

Set up displays

Select items for display

Use props

Identify display areas

Unit: Greenhouse Management

BIL: Recommended

EDU:	12	AD	AC
	I	P	

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

EDU:	12	AD	AC
	R	P	

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

EDU:	12	AD	AC
	R	P	

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

BIL: Essential

EDU:	12	AD	AC
	R	P	

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)

BIL: Essential

EDU:	12	AD	AC
	R	P	

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

EDU:	12	AD	AC
	R	P	

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

EDU:	12	AD	AC
	I	R	

Competency: Compare g

BIL: Recommended

EDU:	12	AD	AC
	I	R	

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

EDU:	12	AD	AC
	I	R	

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