



ISA Certified Arborist Utility Specialist®

EXAMINATION OUTLINE

About the Program

When a professional becomes an ISA Certified Arborist Utility Specialist®, they should be recognized by their peers and the public as a tree care professional who has met minimum experience eligibility requirements and achieved an industry-accepted level of knowledge in core areas in the utility field of arboriculture.

Domains

Domains are the major responsibilities or duties that characterize the practice of utility arboriculture. Percentages denote the amount of the exam that is devoted to each domain.

- Electrical Utility Pruning (25%)
- Program Management (15%)
- Integrated Vegetation Management (15%)
- Electrical Knowledge (29%)
- Customer Relations (16%)

Electrical Utility Pruning

Weight: 25%

Task A: Establish pruning protocols using tree species, site conditions, and utility infrastructure to manage environmental impact, minimize tree stress, consider aesthetics, and meet utility reliability needs.

Knowledge of:

1. Apical dominance
2. Apical control
3. Branch attachment
4. Pruning response (e.g., epicormic shoots, watersprouts)
5. Wound closure
6. Tree species characteristics (i.e., branching pattern, size potential, and growth rate)
7. Pruning objectives (e.g., raising and reduction)
8. Directional pruning (e.g., natural pruning versusb directional pruning)
9. Utility clearance requirements

Skills in:

1. Assessing the potential for tree and equipment conflicts
2. Assessing tree structure (e.g., branch strength, decurrent versus excurrent branching)
3. Predicting growth response to pruning (e.g., direction, rate of growth)
4. Determining the risk of pathogen entry through pruning wounds (i.e., compartmentalization of decay in trees [CODIT] process)
5. Performing a site assessment
6. Determining appropriate pruning method

Task B: Conduct tree pruning to eliminate the interaction between the tree and utility infrastructure using appropriate techniques and equipment to minimize impact on tree health.

Knowledge of:

1. Anatomy and physiology of tree trunk and extremities (e.g., branch collar, branch bark ridge, codominant stems, branch weight)
2. Pruning systems (e.g., natural, pollarding)
3. Improper pruning techniques (e.g., topping or stub cuts)
4. Cutting techniques (e.g., manual, mechanical)
5. Rigging techniques
6. Personal safety when pruning near utility infrastructure (e.g., use of personal protective equipment [PPE], minimal approach distance, use of nonconductive tools)
7. Public safety when pruning near utility infrastructure (e.g., work zone marking, location of equipment, traffic control)
8. Industry standards regarding line clearance (e.g., distance between tree limbs and utility equipment, foliage overhang)
9. Industry-accepted safety standards and local requirements regarding working near electrical systems (e.g., ANSI Z133 Safety Requirements for Arboricultural Operations)

Skills in:

1. Assessing tree height, load, and lean
2. Performing a branch removal cut
3. Performing a branch reduction cut
4. Performing a heading cut
5. Removing a tree (e.g., felling, dismantling)
6. Identifying an appropriate rigging system based on the work objective, tree condition, and site conditions
7. Assembling a rigging system
8. Utilizing rigging to allow for controlled descent of pruned limbs

Task C: Evaluate the tree's condition and associated risks regarding the benefits or limitations of pruning or removal techniques and communicate to interested parties.

Knowledge of:

1. Tree risk assessment
2. Time frame of planned works
3. Power grid reliability (i.e., interactions within the grid system)
4. Necessary conditions for a tree to be safely removed
5. Tree growth habit (i.e., branching structure, morphology)

Skills in:

1. Assessing tree risk associated with trees and electrical facilities (e.g., likelihood of failure, electrical system reliability impacts, financial impacts, environmental impacts)
2. Determining feasibility of tree transplant to another location
3. Assessing the benefit/costs of tree removal or replacement programs

Program Management

Weight: 15%

Task A: Develop a business plan for implementing the vegetation management program.

Knowledge of:

1. Budgeting
2. Procurement and management of contractors
3. Seasonality of implementing vegetation management program features (i.e., seasonal plant growth/response and associated tool/chemical effectiveness)
4. Regulations/industry-accepted safety practices
5. Regulations/industry-accepted environmental best management practices

Skills in:

1. Developing policy in support of the vegetation management program
2. Communicating the importance of a vegetation management program to overall organizational outcomes (e.g., strategic, tactical, operational)
3. Formulating or managing a program budget
4. Assessing equipment and material needs for implementing a vegetation management program
5. Evaluating vegetation management program outcomes

Task B: Implement the vegetation management program using geospatial, remote sensing, and topographical resources.

Knowledge of:

1. GPS/GNSS/GIS systems
2. LiDAR technology and other remote sensing (e.g., multispectral, satellite)
3. Traditional mapping and navigational tools
4. Electronic vegetation management platforms

Skills in:

1. Using GPS/GNSS/GIS technology
2. Interpreting traditional maps (e.g., survey, topographical)
3. Interpreting GPS/GNSS/GIS maps
4. Collecting data using smart devices
5. Utilizing data gathered from smart devices
6. Analyzing information captured using remote sensing technology (e.g., photographs, sensor readings, aerial patrol, LiDAR-derived images)

Task C: Assess the risk that a vegetation management program may generate for the utility company, direct customers, and general public.

Knowledge of:

1. Public safety considerations (e.g., location of projects, conditions near high traffic areas)
2. Reliability standards
3. Land use and rights pertaining to vegetation management (e.g., easement, right-of-way [ROW])
4. Legal and regulatory compliance (i.e., governmental regulations, local ordinances, and protected wildlife and plants)
5. Methods of outreach and public relations
6. Cultural compliance (e.g., laws, regulations, and ethical guidelines designed to protect burial areas, archaeological sites, historical and Indigenous cultural heritage sites)
7. Fire indexes and extreme weather events

Skills in:

1. Identifying vegetation conditions that could cause a mechanical or electrical fault or interruption
2. Recommending appropriate methods to mitigate risk associated with storm and fire events
3. Identifying high use public locations (e.g., parks, walking trails)
4. Monitoring compliance with relevant law and/or regulations

Task D: Assess the outcomes of the vegetation management program.

Knowledge of:

1. Program evaluation
2. Customer relations metrics
3. Reliability metrics (e.g., SAIDI, SAIFI)
4. Performance assessment for employees and contractors

Skills in:

1. Formulating metrics for evaluating the vegetation management program
2. Adjusting a vegetation management program based on recent work outcomes
3. Measuring productivity of crews performing vegetation management
4. Monitoring execution of the vegetation management program
5. Assessing the efficacy of vegetation control methods
6. Analyzing economic and ecological cost of the vegetation management activities

Task E: Develop mitigation plans for addressing fire and extreme weather events.

Knowledge of:

1. Industry-accepted practices in fire prevention
2. Integrated vegetation management principles for electrical ROW
3. Methods for risk assessment (e.g., risk analysis, hazard identification, exposure identification, estimation of risk and loss)
4. Methods for reinforcing (i.e., hardening) and maintaining utility infrastructure to minimize impacts of fire and extreme weather events

Skills in:

1. Conducting risk assessments for on- and off- ROW trees
2. Assessing trees for storm and fire vulnerabilities
3. Assessing how the vegetation management program could contribute toward preventing damage associated with fire and/or extreme weather events (e.g., system hardening)
4. Collaborating on methods for reinforcing (i.e., hardening) utility infrastructure to minimize impacts associated with fire and/or extreme weather events

Task F: Develop an emergency management plan (i.e., large climatic events).

Knowledge of:

1. Emergency management systems
2. Incident Command System (ICS)
3. Resource management (i.e., fleet, logistics, safety, security)

Skills in:

1. Conducting emergency response training
2. Monitoring storm events using technology and communication channels
3. Coordinating electrical system assessments
4. Establishing restoration objectives and priorities
5. Monitoring completion of restoration objectives in accordance with established protocols and priorities
6. Developing a vegetation management emergency response plan
7. Coordinating efforts with Incident Command System personnel and resources
8. Identifying risks and hazards during an event
9. Communicating elements of emergency preparedness to interested parties

Integrated Vegetation Management

Weight: 15%

Task A: Determine vegetation management methods to meet program requirements.

Knowledge of:

1. Project planning
2. Vegetation control methods (e.g., mechanical, cultural, chemical)
3. Timing and desired outcome(s) of vegetation control methods
4. Environmental, Social, and Governance (ESG)

Skills in:

1. Preparing site-specific prescriptions for vegetation management
2. Developing tolerance levels for use as action thresholds for vegetation maintenance treatment options
3. Determining the balance between program goals and customer satisfaction
4. Assessing the economic effects of the program
5. Assessing impact of the vegetation management program on the local ecology (e.g., water resources and animal habitat)
6. Identifying vegetation-related factors that affect outage indexes (e.g., SAIDI, SAIFI)
7. Developing a routine vegetation maintenance plan based on system or site assessment

Task B: Manage vegetation using physical, biological, and cultural vegetation control methods.

Knowledge of:

1. Machinery used for vegetation control
2. Hand tools used for vegetation control
3. Biological and cultural vegetation control techniques
4. How technology can be used to schedule/deploy appropriate management techniques
5. Accepted industry standards and best practices for vegetation management and safety (e.g., ANSI Z133 Safety Requirements for Arboricultural Operations, ANSI A300 Tree Care, ISA Best Management Practices, BSI/ BS3998 Tree Work - Recommendations)

Skills in:

1. Selecting equipment (i.e., machinery and hand tools) to be used for physical vegetation control methods
2. Clearing vegetation using tools (i.e., machinery and hand tools)
3. Mowing utility corridors in accordance with local standards
4. Monitoring adherence to physical safety protocols for self and others
5. Comparing the outcomes of utilizing different vegetation management techniques (e.g., physical, chemical, biological, engineering alternatives)
6. Considering engineering alternatives in vegetation management, where applicable

Task C: Manage vegetation using chemical vegetation control methods.

Knowledge of:

1. Chemical modes of control
2. Types of herbicides
3. Methods of herbicide application
4. Mode of action classes within herbicides
5. Closed chain of custody for herbicides
6. Herbicide toxicity
7. Types of growth regulators
8. Herbicide use regulations (e.g., label, advisor, certification)

Skills in:

1. Selecting herbicides to be used for chemical vegetation control methods (e.g., selective versus non-selective chemical control)
2. Predicting vegetations' physiological response to herbicides
3. Handling herbicides in accordance with regulation and best practices (e.g., storage, mixing, use, disposal)
4. Implementing emergency spill procedures for herbicides
5. Interpreting labels on herbicide containers
6. Applying herbicides in accordance with applicable regulations and label information using a delivery system suitable for the situation and project site
7. Applying growth regulators in accordance with applicable regulations and label information using a delivery system suitable for the situation and project site
8. Monitoring adherence to chemical safety protocols for self and others
9. Measuring efficacy of herbicide application

Task D: Monitor project activities to ensure a minimal unintended impact on the environment.

Knowledge of:

1. Local ecology (i.e., relationship between local flora and fauna)
2. Local threatened and endangered species and prescriptions required for their habitat
3. Wetland management
4. Invasive species management (e.g., plants, insects, diseases)
5. ROW environmental stewardship programs

Skills in:

1. Mitigating the spread of non-native, invasive species (e.g., plants, insects, diseases)
2. Identifying wetlands and other environmentally sensitive areas
3. Monitoring the impact of the vegetation management program on local water resources and animal habitat (including habitat for threatened species and pollinators)

Electrical Knowledge

Weight: 29%

Task A: Identify how electricity is transferred through utility infrastructure.

Knowledge of:

1. Electrical terminology (e.g., voltage, amperage, resistance)
2. Electrical conductivity
3. Electrical induction (i.e., step potential)
4. Electrical systems (e.g., generation, transmission, distribution)
5. Radial versus loop feeds

Skills in:

1. Interpreting circuit or line maps
2. Explaining how different utility systems function

Task B: Identify common electric system hardware.

Knowledge of:

1. Line construction types
2. Pole/line hardware (e.g., transformers, capacitors, insulators)
3. Fuses and reclosers
4. Deenergizing, grounding (i.e., earthing), and isolation

Skills in:

1. Identifying common electrical system hardware (e.g., pole, line)
2. Explaining the functionality of electrical system hardware (e.g., transition of electricity, physical durability)

Task C: Comply with safety standards when working near electrical conductors.

Knowledge of:

1. Sources of electrical shock (i.e., direct and indirect contact)
2. Step and touch potential
3. Standards pertaining to electrical hazards
4. Industry-accepted safety standards and local requirements regarding working near electrical systems (e.g., ANSI Z133 Safety Requirements for Arboricultural Operations, local requirements)
5. Minimum approach distances (i.e., limits of approach)

Skills in:

1. Assessing risk of shock or electrocution
2. Maintaining minimum approach distances (i.e., limits of approach)
3. Identifying voltage differences
4. Understanding situations that cause shock or electrocution (e.g., phase-to-phase, phase-to-ground)
5. Explaining the difference between automatic and manual operation of electrical devices
6. Utilizing PPE to reduce risk of shock or electrocution
7. Operating equipment within its specifications to reduce risk of shock or electrocution

Task D: Assess how vegetation may cause outages.

Knowledge of:

1. Back feed (e.g., causes of and potential harm to the grid, safety risk)
2. Step potential
3. Electrical faults

Skills in:

1. Identifying trees and tree parts that may cause future electrical faults
2. Recognizing trees that have experienced damage due to electrical faults
3. Explaining how utility systems manage fluctuations in electricity distribution to protect utility infrastructure
4. Recognizing that a system protection device has been tripped (e.g., fuses, cutouts, switches)
5. Interpreting outage statistics

Customer Relations

Weight: 16%

Task A: Communicate with the public regarding arboricultural practices and project-related details.

Knowledge of:

1. ROW (i.e., rights and limitations)
2. Easements
3. Deeds
4. Professional conduct (e.g., attire, communication, PPE)
5. Right tree, right place
6. Benefits of trees

Skills in:

1. Explaining arboricultural practices to a general audience (e.g., pruning, right tree/right place, safety concerns)
2. Explaining rights of utility and property owners in the context of the ROW
3. Communicating the need for vegetation clearing for safety and reliability to homeowner/ratepayer (e.g., service interruptions, property damage, fire hazards)
4. Discussing how methods of conducting the vegetation management program can impact the public (e.g., use of chemicals and equipment)
5. Informing property owners and other interested parties of vegetation management activities
6. Mitigating conflict between the vegetation management program and interested parties/customers
7. Addressing landowners and interested parties in an effective and professional manner

Task B: Align the vegetation management program with governmental rules and regulations.

Knowledge of:

1. Interrelation between the utility provider and relevant governing bodies
2. Jurisdictional boundaries between relevant governing bodies
3. Real estate terms (e.g., fee owned, easements, adverse possession)

Skills in:

1. Searching for property records
2. Searching for applicable local regulations or ordinances
3. Interpreting applicable local regulations or ordinances