Campus Tree Care Plan

Florida Institute of Technology
Melbourne, Florida
# Table of Contents

Purpose and University History 3-4

Campus and locations 4-5

Tree Advisory Committee 6

Arboricultural/Horticultural Practices 6-7

Tree Planting Standards 7

Special Trees 8

Maintenance Objectives 9

Subcontracted Tree Work – procedures 9-12

Horticultural Practices 12

- Mulching 12
- Irrigation 12
- Fertilization 12
- Pest Management 13
- Emergency Situations 13
- Tree Removal 14
- Prohibited Practices 14

Protection and Preservation 14

Planning before Construction 14

Vehicle access 14

Protective Measures 15

Fencing 15

Construction Interference from Remaining Trees 16

Trenching 16

Above Ground Pruning 17

Root Pruning 17
| Remediation and Recovery                        | 17 |
| Tree Damage Assessment, Penalties and Enforcement | 17 |
| Recommended Trees                             | 18 |
| Prohibited Trees                               | 19 |
| Goals and Targets                              | 19 |
| Service Learning Opportunities                 | 19 |
| Public Awareness                               | 20 |
| Communication Strategy                         | 20 |
| Glossary                                       | 21-22 |
Purpose

The overall goal of the Tree Care Plan is to ensure a safe, attractive, healthy and sustainable campus tree population. Guidelines have been developed to further this goal by providing designers, construction firms, landscaping personnel and other members of the college community with the tools needed to minimize the negative impacts of their programs on the College's tree population. This campus tree care plan will identify the policies, procedures, and practices that are to be used in establishing, protecting, maintaining, and removing trees on the Florida Tech campus. The overall goal of the plan is to ensure a safe, attractive, and sustainable campus urban forest. The specific objectives of the plan are:

- Ensure proper species selection, high-quality nursery stock acquisition, and industry-consensus planting procedures;
- Promote species diversity and proper age structure in the tree population;
- Protect high-value campus trees during construction and renovation projects;
- Promote tree health and safety by utilizing ISA’s (International Society of Arboriculture) best management practices when maintaining campus trees;
- Ensure that trees are reasonably replaced when there is mortality due to weather, pest infestations, injury, or construction displacement;
- Encourage campus community members to be involved and respect and value the campus urban forest.

Note: This plan has been disseminated in partial fulfillment of the Arbor Day Foundation’s standards for Tree Campus USA designation and does not reflect official university policy on all matters. However, many of these policies, procedures, and practices are currently in place and administered. The FITree Committee is seeking to have the plan officially adopted by the university.

Sustainability, Ecosystem Services and Native Plant Landscaped Areas on Florida Tech Campuses

As a part of a sustainability initiative, the University has also focused on utilizing a more native plant palette. On a more global level, Florida Tech focuses on our ecosystem footprint, understanding that it’s our responsibility to set an example in restoring, conserving and enhancing the sustainable use of ecosystems and the services they provide. From an educational and maintenance standpoint, Florida Tech wants what is best –both aesthetically and in practice. Maintaining and adding trees to the Florida Tech campus and satellite locations helps to mitigate the greenhouse gas emissions through the process of carbon sequestration, in addition to their many ecological values including making oxygen, erosion control, purifying and intercepting water, providing habitat for numerous species, maintenance of air quality, aesthetics, and their effects on microclimate. With this in mind, we blend in native trees species where possible and appropriate.

Florida Tech Campus(es) Urban Forested Habitat

The Florida Institute of Technology (Florida Tech) is a multi-campus four-year university located in the Melbourne, Florida area, encompassing a growing expanse of 175+ acres. The only independent, technological university in the Southeast, Florida Tech currently serves a student population of more than 5,400 students annually (plus an additional 3,432 online).
In 1958, “Brevard Engineering College” was founded by Dr. Jerome P. Keuper to offer continuing education opportunities to scientists, engineers and technicians who are working for NASA at Cape Canaveral, working at what is now Kennedy Space Center. The new school grew quickly, in many ways parallelling the rapid development of space technology that was taking place at Cape Canaveral. Established in its current location in 1961, the campus grew continuously and in 1966, the school changed its name to The Florida Institute of Technology, Florida Tech for short.

The main campus in south Melbourne has landscaped areas with numerous trees.

Typical trees that are found in the landscaped areas include cabbage palmetto (palmetto), live oak (Quercus virginiana), Canary Island date (Phoenix canariensis), Reclinata/Senegal date (Phoenix reclinata), crape myrtle (Lagerstroemia indica), southern magnolia (Magnolia grandiflora), dahoon holly (Ilex cassine), laurel oak (Quercus laurifolia), elms (Ulmus spp.), pond cypress (Taxodium ascendens), bald cypress (Taxodium distichum), pines (Pinus spp.), and other types of oaks (Quercus spp.). There are collections of other palms, such as Foxtail palm (Wodyetia bifurcata), Pindo palm (Butia capitata), Queen palm (Syagrus romanzoffiana), and true Date Palms (Phoenix dactylifera). Our botanical garden and surrounding areas contain numerous specimen palms as well.

Other Campus locations:

**River’s Edge – Online Learning Campus, Palm Bay, FL 6.92 acres**

Located on US Route 1 in Palm Bay, Florida, the River’s Edge campus is situated on the south side of Turkey Creek. This creek feeds directly into the Indian River Lagoon, less than a half mile away.

Typical tree species found in this creek-side property are include cabbage palmetto (palmetto), live oak (Quercus virginiana), crape myrtle (Lagerstroemia indica), red maple (Acer rubrum), dahoon holly (Ilex cassine), and laurel oak (Quercus laurifolia).

**Panther Bay, Residential Halls/Greek Village, Palm Bay, FL, 11.93 acres**

Typical tree species found on this property are cabbage palmetto (Sabal palmetto), live oak (Quercus virginiana), southern magnolia (Magnolia grandiflora), crape myrtle (Lagerstroemia indica), Ligustrum japonicum (Japanese Ligustrum/Privet), (European fan palm) and Pygmy Date palm (Phoenix robellini).

**Center for Aeronautics and Innovation , Melbourne, FL, 4 acres**

Typical tree species found on this property are cabbage palmetto (Sabal palmetto), live oak (Quercus virginiana), southern magnolia (Magnolia grandiflora), Mexican fan/ Washingtonia palm (Washingtonia robusta), and Pygmy Date palm (Phoenix robellini).

**Applied Research Laboratory, 3.63 acres**

Typical tree species found on this property are cabbage palmetto (Sabal palmetto), laurel oak (Quercus laurifolia), and Pygmy Date palms (Phoenix robellini).
The Florida Tech Research & Development Center, Palm Bay, FL, 5.001 acres (acquired September 2013)

Typical tree species found on this property are cabbage palmetto (Sabal palmetto), live oak (Quercus virginiana), Pygmy Date palm (Phoenix robbellini) and Crimson bottlebrush (Callistemon citrinus).

Anchorage, Melbourne, FL, 3.06 acres

Just a few minutes from campus, where Crane Creek meets the Indian River Lagoon near downtown Melbourne, the Ralph S. Evinrude Marine Operations Center houses small outboard-powered craft and medium-sized workboats. These vessels are available to graduate students and faculty for teaching and research use in the freshwater tributaries and the Indian River Lagoon. Coastal and oceanographic research and teaching is conducted through strategic partnerships with research vessels in Ft. Pierce, Tampa, Savannah, GA and the University of Miami’s Rosenstiel School.

Typical tree species found on this property are cabbage palmetto (Sabal palmetto), live oak (Quercus virginiana), and laurel oak (Quercus laurifolia).

Vero Beach Marine Laboratory, Vero Beach, FL, 4.02 acres

Oceanfront property in nearby Vero Beach. This facility serves as a field station for the university in support of research and teaching in the marine sciences.

Typical tree species found on this property are cabbage palmetto (Sabal palmetto), live oak (Quercus virginiana), and Scrub sand live oak (Quercus geminate).

The Emil Buehler Center for Aviation Training and Research, 4 acres (non-runway/hangar space)

The Operations center for the College of Aeronautics, at Melbourne International Airport (MLB).

Typical tree species found on this property are cabbage palmetto (Sabal palmetto), live oak (Quercus virginiana), Bismarck palm (Bismarckia nobilis), Foxtail palm (Wodyetia bifurcata), and southern magnolia (Magnolia grandiflora).

Foosaner Art Museum and Education Center, Downtown Melbourne, FL, 1.12 acres

This facility accommodates an extensive program of studio classes where both children and adults now study and create their original artwork. Property includes an art museum across the street, open to the public.

Typical tree species found on this property are cabbage palmetto (Sabal palmetto), live oak (Quercus virginiana), Mexican fan/ Washingtonia palm (Washingtonia robusta), Chinese Fan Palm (Livistona chinensis), Pygmy Date palm (Phoenix robbellini), dahoon holly (Ilex cassine), and laurel oak (Quercus laurifolia).

Mary Start of the Sea/Newman Hall, Residence Hall, Melbourne, FL, 2.5 acres

Constructed in summer of 2013, this faith-based residence hall provides apartment-style living for 148 students.

Typical tree species found on this property are live oak (Quercus virginiana), crape myrtle (Lagerstroemia indica), Winged elm (Ulmus alata), southern magnolia (Magnolia grandiflora), dahoon holly (Ilex cassine), and bald cypress (Taxodium distichum).
Awareness and Responsibility

All persons working on Florida Institute of Technology properties will have knowledge of these guidelines before work begins. It is the contractor’s or Grounds manager’s responsibility to ensure that his workers and subcontractors understand and abide by these guidelines and any subsequent plans. Penalty assessments will be made in the event of any breach of these aforementioned guidelines and contractors may be required to reimburse Florida Institute of Technology for tree damages caused in failing to follow these guidelines.

Responsible Department – Facilities/Grounds Operations

Tree Advisory Committee (FITrees)

The University Campus Tree Advisory Committee (FITrees) will be a formal standing committee sponsored by the Facilities Department composed of 6 -8 members, one each from Grounds Services, Facilities Planning, relevant academic departments (such as the Sustainability Studies Department) and the Florida Institute of Technology community at large. A student representative, appointed by the Student Council or Faculty will also serve on the committee.

Current members:

- Dr. Ken C. Lindeman, Professor, Education and Interdisciplinary Studies/Sustainability
- Sarah K. Arnall, Volunteer Coordinator, FL Tech Botanical Garden
- Steven Graham, Parks Administrator, City of Melbourne
- Lily Buth, student, Construction Management
- Holly Chichester, University Horticulturist and Manager of Grounds
- Gregory Tsark, Vice President, Facilities Operations, University Architect

The Committee will advise the college on proposed modifications to campus open space and landscaping to insure high aesthetic and functional quality; develop and maintain a list of satisfactory and desired species of trees; encourage the use of an appropriate variety of plant materials in new plantings; make recommendations on landscape renovations and maintenance. Representatives will serve for three academic years with a renewal option at the end of their term with the exception of the student member, who will serve for two to four semesters (or one academic year).

The committee meets biannually with additional meetings scheduled as needed throughout the year and provides important input in to care and improvement of the campus landscape. The University Campus Tree Care Plan will be revisited by the Committee every year to maintain relevancy.

Arboriculture/Horticultural Practices

Planting and Landscaping

Tree species and/or cultivars included in the List of Recommended Trees shall be hardy to a minimum of USDA hardiness zone 9a, 9b and be pest resistant so as to minimize pesticide use and maintenance needs.
The Grounds Manager/University Horticulturist will have the final say on the appropriateness of species introduced to campus so long as the species is not included in the list of prohibited trees.

**Tree Planting Standards**

- Holes must be at least twice as wide as the diameter of the root ball of a tree.
- Height: Before placing the tree in the hole, check to see if the hole is deep enough. The top of the root ball should be 2 - 3 inches above grade.
- Avoid damaging the tree when setting it in the hole by always lifting by the root ball.
- Straighten the tree in the hole, being sure to view the tree from several directions to confirm the tree is straight.
- Fill about one third of the hole, then gently pack the soil around the root ball. If using a balled and burlap root ball, cut the twine, remove the top third of the wire basket and pull back the burlap to expose the top of the root ball. Fill in the remainder of the hole and gently pack to remove air pockets that may cause roots to dry out.
- If the soil is poor or full of debris, it should be removed and replaced with fertile topsoil.
- If the soil is compacted, it should be broken up, loosened and amended with composted organic material. Composted organic material will improve the drainage and aeration of the soil. This material should be incorporated at 25 - 50 percent of total soil volume in the rooting area.
- Trunk Flare should be visible after the tree has been planted and mulched.
- Water: thoroughly water in the root ball and add more soil if settling of backfill occurs.
- Mulch: Cover the tree ring with 2 - 4 inches of mulch making sure the trunk is not covered. There should be a mulch free area of 1 - 2 inches from the trunk flare.

![Diagram illustrating proper planting procedure for a tree or shrub.](image)

**Trees Planted within Patio Spaces**

- The minimum size for an in-pavement planter cutout is 4 feet by 4 feet in sidewalks, patios, and parking lots.
- If the soil is poor or full of debris, it should be removed and replaced with fertile topsoil.
- If the soil is compacted, it should be broken up, loosened and amended with composted organic material.
- Composted organic material will improve the drainage and aeration of the soil. This material should be incorporated at 25 – 50 percent of total soil volume in the rooting area.
- When applicable, root control fabric will be used when planting within a hardscape in order to control the growth of roots and prevent expensive damage of pavement and other landscaping details without permanent damage to the tree’s root system.

**Special Trees**

Heritage Trees: individual trees on Florida Institute of Technology campuses that have developed exceptional historical, cultural, or aesthetic value because of their age, descent, legendary stature, contribution to the diversity of the campus landscape, exemplary representation of genus or species, rarity, or association with an important event or person.

Our expectation is that these trees will not be affected by development of the campus and/or we will employ all means necessary to maintain the health and lifespan of these trees should relocation be required.

**Criteria**

The following will be seriously considered when designating a tree or group of trees as heritage trees.

- Age is an important criterion and will vary by species.
- Historic Significance is an association with an important event or person.
- Location and Setting designates a contribution to a significant view or spatial structure of a setting.
- Size or habitat designates an exemplary representation or a genus’s or species’ characteristics.

**Process**

The following process will be followed in order to designate trees not specified in this Tree Care Plan as heritage trees. The Grounds Manager/University Horticulturist has determined initial designations after consultation with relevant college community members.

Subsequent nominations may be made by any member of the university community. Nominations should include a photo documentation of the candidate tree as well as a narrative explaining how the candidate tree fulfills a minimum of three criteria for heritage designation.

The University Campus Tree Advisory Committee (FITrees) will review and evaluate all nominations.

The university community will be notified of newly designated heritage trees.

To ensure appropriate protection of heritage trees and landmark space, the Grounds Department will maintain the list of heritage trees, landmark spaces and a map of their locations. This element of the Care Plan is in process.
Maintenance Objectives

Reduce potential hazardous conditions in trees and improve tree structure by:

- Removing dead branches
- Reducing the weight of branches or stems with included bark
- Reducing the weight toward the ends of all but one co-dominant stem
- Thinning the canopy

Pruning shall not be conducted without a clear objective or outcome; prune first for safety, next for health, and finally for aesthetics.

General Procedures for Subcontracted Tree Work

- Preference will be given to firms who have at least one certified arborist on their staff.
- Certification is through the International Society of Arboriculture (ISA).
- A certified arborist shall be on site at all times during work activities.
- Violation of these procedures and techniques could result in termination of contract without payment.
- When possible the preferred tree pruning work schedule will be when campuses are closed: Spring Break in March, between spring and summer semesters break, summer and fall semesters break, Thanksgiving week, Winter Break and weekends.
- All debris shall be removed from the site at the completion of the job.
- No young trees less than 10 inches trunk diameter shall be pruned.
- Live branches less than 1.5 inches diameter should not be removed.
- When removing branches, the pruning cut shall not damage the branch bark ridge and branch collar. Internode (heading) cuts should not be used except in storm response and crown restoration procedures.
- Dead branches greater than 1.5 inches in diameter (measured at the base of the branch) shall be removed from the canopy of all trees.
- No live branches greater than 8 inches diameter shall be removed from the tree without authorization from our Grounds Manager/University Horticulturist.
- Remove no more than 20 percent of live foliage from the tree.

Pruning Techniques

Pruning cuts shall be in accordance with ANSI A300 pruning standards.

Tools and equipment

- Climbing spurs shall not be used when climbing trees, except to climb a tree to be removed or to perform an aerial rescue of an injured worker.
- Equipment and work practices that damage bark or cambium should be avoided.
- Rope injury from loading out heavy limbs should be avoided.
Safety

All work shall be performed by workers trained in accordance with ANSI Z133.1 safety regulations as required by OSHA.

Areas of inclusion

Each campus will provide a brief description of the trees to be pruned so there can be no confusion.

A pre-work walk-through and location map will be provided.

Exclusions

Each campus will provide a brief description of the trees and large shrub that are not included in a pruning bid, such as Ligustrum, waxmyrtles, etc.

Additional Requirements

All debris and equipment shall be removed from the site by the end of each workday.

The selected contractor shall be required to furnish a certificate of insurance to include liability (minimum $1,000,000.00), automotive, and worker’s compensation before commencing work.

Pruning Schedule

- The maintenance pruning schedule shall be dictated by tree species, age, function, and placement.
- A certified arborist is required to be on job site during all work being performed.
- Trees less than 7 years old should receive structural pruning on an annual or biennial basis.
- Trees 7 - 20 years old should receive structural pruning every two to five years.
- Trees 20 years old and older receive maintenance pruning every five to seven years to clean dead, diseased, dying, and defective branches from the crown.
- Trees adjacent to roadways, walkways, signs, and street lights are annually inspected for safety and clearance issues and maintenance pruned as necessary.
- Branch reduction or thinning should be used to achieve pruning objectives rather than making large branch removal cuts.
- Large branches that are dead, diseased, dying or defective should be removed with the aid of ropes and rigging equipment to minimize the risk of tree injury from falling debris.

Thinning

- Performed to reduce the density of branches, which increases light penetration, improves visibility, and decreases wind load.
- Assess how a tree will be pruned from the top down.
- Favor branches with strong, U-shaped angles of attachment. Remove branches with weak, V-shaped angles of attachment and/or included bark.
- Remove any branches that rub or cross another branch.
- Make sure that lateral branches are no more than one-half to three-quarters of the diameter of the main stem to discourage the development of codominant stems.
- Do not remove more than one-quarter of the living crown of a tree at one time. If it is necessary to remove more, do it over successive years.

![Correct Pruning Cut](image)

![Too Close](image)

![Too Long](image)

![Too Slanted](image)

*Graphics courtesy of arborday.org*

**Raising**

- Performed to provide vertical clearance from thoroughfares, signs, street lights, and structures.
- Maintain live branches on at least two-thirds of a tree’s total height.
- Remove basal sprouts and vigorous epicormic sprouts.

**Reduction**

- Performed to decrease the overall height of a tree or to decrease the length of an individual branch.
- Use only when absolutely necessary.
- Make the pruning cut at a lateral branch that is at least one-third the diameter of the stem to be removed.
- If it is necessary to remove more than half of the foliage from a branch, remove the entire branch.
- Topping, heading, hat-racking, or any other form of inappropriate crown/branch reduction pruning shall not be permitted except in emergency situations or in executing a crown restoration procedure (and only under the express direction of the University Horticulturist).

**Cabbage palm, Sabal Palm pruning**

- Only prune during last week of July to first two weeks of August according to guidelines listed
- **NO HURRICANE CUT**
- Dead fronds can be removed with a small chain saw. Use a hand saw only to cut developing flower and fruit stalks that emerge between live fronds so you do not injure the surrounding fronds.
- When pruning palm trees, less is better.
- Never over prune palms by subjecting them to what's called "hurricane pruning" or "hurricane cutting," where all but a few fronds are cut off.
- Palms are naturally able to withstand the high winds that hurricanes bring, so removing fronds isn't necessary. Over pruning can seriously damage the palm tree. Green leaves serve as the tree's energy factory. When pruning palms, only remove fronds that are completely brown that hang below the 9 o'clock or 3 o'clock position.
- Remove lower fronds that are chlorotic or dead. There is no biological reason to remove live green fronds on palms. There is no research supporting the notion that removing live green fronds reduces future pruning requirements. Remove lower fronds that are dead or more than about half chlorotic. Do not remove green fronds or the palm could become stressed. (If you decide to remove green fronds, do not remove those growing horizontally or pointed upward.) Over pruned palms look terrible and could attract pests. In the detail above you can see that many upright fronds were removed. Why remove green fronds when the palm was planted for its tropical look. That tropical look results from live green fronds.

**Reasons for Pruning Palms**

- Remove dead and dying lower fronds to improve the appearance of palm.
- Dead and dying fronds and loose petioles are weakly attached to some palms and can place people and property at risk should they fall from tall palms.
- Remove fruit clusters, (in public landscapes where falling fruit and flower debris can be messy as well as hazardous. Some palms generate copious amounts of seedlings near the plant. Removing flowers or fruit reduces the number of potential seedlings).
- Do not shave or sand the trunk smooth.

**Horticultural Practices**

**Mulching**

All trees should have 2 – 4 inches free from base of trunk. Periodically, drip lines of larger trees and tree grouping are mulched extensively with waste woodchips, pine straw or pine bark. Six foot diameter mulch areas shall be maintained around all trees. Mulch shall be maintained at a depth of one to three inches.

**Irrigation**

New shrub and tree planting is hand watered from a spigot or a mobile water tank or automatic irrigation systems. Newly planted trees shall receive one inch supplemental water per one inch caliper (determine by GPH or GPM drip line devices) daily using drip irrigation devices for the first two years through the automatic sprinkler system or through hand-watering.

**Fertilization**

There is no regular tree fertilization beyond treatment received as a result of lawn fertilization. Specimen, high visibility or high value trees may receive prescription fertilization when severe nutrient deficiencies are diagnosed. We are currently shifting our fertilization program to an ecologically
Pest Management

Most pest management is handled through the college’s integrated pest management plan, though trees may be treated for pest problems as needed. Should a pest infestation be suspected, please contact the University Horticulturist/Manager of Grounds.

Integrated Pest Management (IPM) is a pest management strategy in which a combination of means including design choices, cultural practices and chemical controls are used to manage pests in the landscape. A healthy sustainable landscape is dependent upon choosing the right plant for the site. The Grounds department strives to use improved cultivars, disease resistant varieties and proven species whenever possible.

Several cultural practices are implemented in a successful IPM program. Soil is amended to promote healthy vigorous plants. Sustainable/Renewable mulches (pine bark and/or a custom Melaluca-Eucalyptus blend) are used to suppress weeds, insulate the soil and regulate moisture. Turf is mowed at regular intervals at the proper height and fertilized per University of Florida recommendations. As of Fall 2013, Florida Tech has made the switch to BioGreen liquid fertilizer for turf and ornamentals (all natural, bio-based and environmentally friendly). Proper pruning is practiced on all trees and shrubs in accordance with the specifications outlined in the Florida Tech Tree Care Plan. A wide variety of species are planted not only for visual interest but for genetic diversity. Older, more disease prone varieties are gradually removed and replaced with disease and insect resistant varieties.

As a last resort chemical means are used to control pests. Chemical controls are generally used only as a curative measure; however, there are some circumstances where less chemicals used in a preventative application are more effective than a greater quantity of chemicals when curatively applied. The college is committed to using the least toxic chemicals available to control particular pests. Organic pesticides are used whenever possible.

Planting and Tree Diversity

As the campus evolves, increasing the diversity of tree species is extremely important. However, species selection must be dictated by site conditions. Based on the vernacular of the site, some landscapes will be planted with native species while others may include exotics. Known invasive woody plants are consciously avoided in tree planting plans.

Storm Response and Recovery

Storm response and recovery are generally accomplished in-house. In a hurricane or other storm crisis, the first priority is to remove tree debris that blocks campus thoroughfares, disrupts campus operations, or poses hazards to the campus community. Once these critical needs are addressed, a prioritized recovery plan is implemented during which unsalvageable trees are systematically removed and salvageable trees are pruned to restore their health and structure.

As the tree planting budget permits, lost trees are strategically replaced to restore the structure and function of the campus urban forest in a reasonable time frame. During storm response and recovery, trees requiring specialized equipment not available in-house are addressed by outside contractor.
Hazard and Emergency Tree Removal

When a tree removal request is made, a certified arborist evaluates the tree in question and makes the determination for removal or not, based on the result. If the tree is considered a hazardous tree, it is then scheduled for removal. All hazardous trees have two things in common, a significant defect and a potential target for falling on a building, car or pedestrian. Most tree removals are done by staff or contractor. Very large trees needing a crane are contracted out.

Stump Grinding

After trees are removed the stumps are then scheduled for grinding, provided there is adequate access to the site. When the stump is ground out, the grindings are raked and left slightly mounded to allow for decay and settling to occur.

Prohibited Practices

Florida Tech trees may not be used for any purpose that in any way would be detrimental to the trees. The activities restricted under this policy include but are not limited to:

- Cutting down or otherwise destroying or damaging campus trees
- Under no condition shall a tree be planted on the Florida Tech campus for dedication or any other purpose without pre-approval from the University Horticulturist and/or the Vice President of Facilities Operations.
- Posting of signs, artwork, or banners
- The hanging of hammocks, or the use of slacklines
- Bicycle parking
- Leashing dogs
- Attaching any object to a tree

Protection and Preservation

Planning Before Construction

In the early stages of construction planning, the Grounds Department will be notified in order to assess the trees and other green spaces within the proposed work site. Recommendations will be made based on this assessment and presented to the project manager and all appropriate personnel.

Any deviation from these standards must be approved in writing by the University Horticulturist and/or the Vice President of Facilities Operations. Any infrastructure project that impacts campus trees must provide a written Tree Protection Plan to the Grounds Department for review and approval no less than two (2) weeks before construction begins. Trees may not be removed or damaged before prior approval is received.

All involved should be made aware of the Tree Protection Guidelines and the specific site recommendations. Design and bid specifications will incorporate these guidelines for awareness.
Protection of trees that remain within a construction site is a high priority and the college requires contractors to use every reasonable measure to protect the root system and canopy of these trees. The Grounds department is available to contractors for consultation on the best measures to protect individual trees and root systems and assist with establishing Tree Protection Zones.

**Vehicle Access**

Set entrance and exit points on site will be determined prior to breaking ground on the project. Vehicles accessing the site will use only the designated entrances and exits so as to prevent damage to on-site trees.

1. Unless impractical, designate only one access route on and off the construction site. Grounds Management approval must be obtained for additional access road locations. The access drive should be restricted to an area that will later serve as a route for utility wires, water lines or roads/sidewalks.

2. If the access drive cannot be confined to a space to be used for utility wires, water lines, or roads/sidewalks, logging mats (see p. 16) will be used to protect critical tree root areas.

3. This construction entry shall consist of 10’ by 16’ oak logging mats on 6’ coarse, chipped, hardwood placed on a permeable structural filter fabric, top-dressed with an additional 10’ of hardwood mulch. Mulch and logging mats shall be supplemented throughout the project to keep the access area structurally functional.

4. Parking: All contractors must be instructed where they are permitted to drive and park their vehicles. Contractors will not be authorized to park on landscape or sidewalks without express approval from Grounds Management.

**Protective Measures**

Within a site, tree protection fencing will be installed around the root zone (extending beyond the drip line) of each tree before any construction, excavation, demolition, land clearing, grading, or other land disturbance begins.

A certified arborist or a qualified member of the Grounds department will determine which trees require protection and the area of protection and mark said area.

The contractor or subcontractor or personnel responsible for the project will construct and maintain fencing, for each protected tree or group of trees on the site, encircling the outer limits of the critical root zone to prevent unnecessary damage. Project managers will ensure that work sites do not spread onto nearby areas outside the designated work zone.

**Fencing**

Chain link fencing or wood fencing of at least four feet height and supported at a maximum of ten-foot intervals by posts will be used. Wooden stakes and rebar posts are not considered an approved method sufficient enough to keep the fence upright and in place.

1. For every inch of trunk diameter measured at 4’ above grade, fencing will be 1 foot from the tree trunk. For example: a five-inch diameter tree will have fencing at least 5 feet from the tree. All fencing will remain in place until construction is completed.
2. Within the fenced areas no materials, soil, gravel, etc. will be stored, no vehicles or equipment will be parked or maneuvered, neither excavations nor grade changes will occur and no new pavement will be installed.

3. Spreading the Load - if materials are stored outside the fenced area but within the drip line of trees, logging mats and mulch will be used to prevent compaction of the soil surrounding tree roots. If traffic across a protected root zone is unavoidable, using one of the following bridging methods in the traffic area is required: a logging mat, plywood panels, or geotextile fabric and six inches or more of wood chips. Avoid working in the area if the soil is wet. All materials need to be removed once construction activity has ended.

4. Signage: Clearly visible “Keep Out” signs are to be posted on all sides of fencing at minimum intervals of 15’. These signs are to be maintained as long as the fence is in place. All protective fencing will remain in place until exterior work has been completed.

5. Vinyl construction fencing: such fencing will only be permitted as an exception for cases where metal or wood fencing is not feasible. Contractors must obtain written approval from the Facilities Project Manager to use vinyl fencing for tree protection.

6. Stump removal: Trees cleared from the site and the perimeters of the site will have their stumps removed by grinding them out to protect and preserve nearby saved trees.

7. No parking of ANY vehicle will be permitted within in the drip line of any trees within the construction site or anywhere on campus.

**Construction Interference from Remaining Trees**

When trees that are to remain on site after construction interfere with construction attempts, the following guidelines apply:

**Trenching**

- When trenching or digging near trees, every effort will be made to avoid damage to the tree’s root system.
- If utilities cannot be routed a safe distance from a tree as defined by the drip line, boring will be used to minimize damage and future risk.
- Roots damaged by trenching or digging should be pruned by a certified arborist before the area is backfilled. Root pruning is a process in which clean cuts are made to allow for the fastest callusing of necessary wounds and healthy re-growth of lost root systems.
- Silt Fences: Silt fencing will be anchored above tree roots by folding one foot of the fencing to the uphill side of the tree and then covering this fold with six inches to one foot of gravel to hold it in place. Placing silt fence as such should avoid unnecessary trenching of tree roots.
Above Ground Pruning

In the event limbs are causing a clearance issue for equipment or otherwise, the Grounds Department should be notified as soon as possible. All pruning of above ground branches will be performed by or under the supervision of a certified arborist.

Root Pruning

As with above ground pruning, trees benefit from clean cuts on their roots as well. Notify the Grounds Department or the Florida Tech Project Manager when encountering roots during construction. A certified arborist needs to prune these cleanly before backfilling occurs.

Remediation and Recovery

The University will take steps to aid the contractor in the recovery of trees traumatized by construction in the surrounding area.

- Contractors will remove contaminated soil and aerate compacted soil.
- Contractors will keep the same grade as before construction—more than two additional inches of soil or sod can ultimately kill an otherwise healthy tree.
- The University will monitor trees for as long as needed, checking for insects or disease that can strike a weakened tree.
- The University will water trees during dry periods to help them recover from after construction stress.
- The University will fertilize annually with a slow-release non-burning complete fertilizer.

Tree Damage Assessment, Penalties and Enforcement

Trees are visually inspected weekly by staff and reported to manager. An independent arborist contractor is called in to assess and give recommendation on any tree that poses a hazard.

Any tree damage created by a contractor or their suppliers, will be evaluated and the cost of damage, replacement or maintenance will be evaluated by the Florida Tech University Horticulturist/Manager of Grounds with an option for Florida Tech to engage an independent arborist if the contractor disputes the value as excessive. The party responsible for the damage will then be billed by Florida Tech for damage incurred. If the damage was a result of a construction project, the cost will be billed to the contractor.
**Recommended Trees**

Replacements and New Construction, to include, but not limited to:

<table>
<thead>
<tr>
<th>Botanical Names</th>
<th>Common Names</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acer rubrum</em></td>
<td>Red maple</td>
</tr>
<tr>
<td><em>Acoelorrhaphe wrightii</em></td>
<td>Paurotis palm</td>
</tr>
<tr>
<td><em>Bismarckia nobilis</em></td>
<td>Bismarck palm ('Silver Select' preferred)</td>
</tr>
<tr>
<td><em>Butia capitata</em></td>
<td>Pindo/Jelly palm</td>
</tr>
<tr>
<td><em>Callistemon spp.</em></td>
<td>Bottlebrush</td>
</tr>
<tr>
<td><em>Conocarpus erectus</em></td>
<td>Silver buttonwood</td>
</tr>
<tr>
<td><em>Crataegus spp.</em></td>
<td>Hawthorn</td>
</tr>
<tr>
<td><em>Gordonia lasianthus</em></td>
<td>Loblolly bay (wet areas)</td>
</tr>
<tr>
<td><em>Ilex cassine and cvs.</em></td>
<td>Dahoon holly (and cultivars)</td>
</tr>
<tr>
<td><em>Ilex vomitoria and cvs.</em></td>
<td>Yaupon holly (and cultivars)</td>
</tr>
<tr>
<td><em>Juniperus silicicola</em></td>
<td>Southern red cedar</td>
</tr>
<tr>
<td><em>Lagerstroemia indica</em></td>
<td>Common crapemyrtle</td>
</tr>
<tr>
<td><em>Livistona chinensis</em></td>
<td>Chinese fan palm</td>
</tr>
<tr>
<td><em>Magnolia grandiflora</em></td>
<td>Southern magnolia</td>
</tr>
<tr>
<td><em>Magnolia virginiana</em></td>
<td>Sweetbay</td>
</tr>
<tr>
<td><em>Pinus elliottii</em></td>
<td>Slash pine</td>
</tr>
<tr>
<td><em>Pinus palustris</em></td>
<td>Longleaf pine</td>
</tr>
<tr>
<td><em>Quercus geminate</em></td>
<td>Scrub sand live oak</td>
</tr>
<tr>
<td><em>Quercus shumardii</em></td>
<td>Shumard oak</td>
</tr>
<tr>
<td><em>Quercus virginiana</em></td>
<td>Live oak</td>
</tr>
<tr>
<td><em>Sabal palmetto</em></td>
<td>Cabbage palmetto</td>
</tr>
<tr>
<td><em>Taxodium ascendens</em></td>
<td>Pond cypress</td>
</tr>
<tr>
<td><em>Taxodium distichum</em></td>
<td>Bald cypress</td>
</tr>
<tr>
<td><em>Ulmus alata</em></td>
<td>Winged elm</td>
</tr>
<tr>
<td><em>Ulmus parvifolia and cvs.</em></td>
<td>Chinese elm</td>
</tr>
<tr>
<td><em>Vitex agnus-castus</em></td>
<td>Chaste tree</td>
</tr>
</tbody>
</table>
Prohibited Trees

Any trees listed by the Florida Exotic Council are considered as invasive are prohibited from installation in the landscape on the Florida Institute of Technology campuses. (http://www.fleppc.org/list/list.htm).

Botanical Names               Common Names

*Casuarina cunninghamiana*         Australian pine
*Casuarina equisetifolia*         Australian pine
*Casuarina glauca*                Australian pine
*Cinnamomum camphora*             Camphor tree
*Melaleuca quinquenervia*         Paperbark tree
*Sapiumse biferum*                Chinese tallow
*Schinus terebinthifolius*        Brazilian pepper
*Enterolobium cyclocarpum*        Elephant ear tree

Goals and Targets

1. **Tree Inventory/Digital Arboretum**

A partial tree inventory of Florida Tech (including the Botanical Garden) is in the process of being created utilizing basic GPS to transfer into the i-Tree Streets Software, which focuses on the ecosystem services and structure of tree populations. It makes use of a sample or complete inventory to quantify and puts a dollar value on the trees’ annual environmental and aesthetic benefits, including energy conservation, air quality improvement, carbon dioxide reduction, storm water control, and property value increase.

Budget to purchase a GPS unit (a multipurpose instrument to mark and map valves, trees, etc.) to use in the field to collect data and download into i-Tree Streets Software is a goal for 2014. This database, (to be made available online) includes the locations and basic details of all major trees on campuses university-wide. The University looks to expand upon this equipment and increase the utility of the equipment, particularly as pertains to future construction projects, campus planning projects, tree management, academic created exercises and public education.

2. **Service Learning Opportunities**

Florida Tech encourages service from the University’s student club community with the goal of participation from individual organizations as well as the Student Government organizations on campus. Groups can currently become involved in three ways:

a. Participation in a Campus Clean-up

b. A scheduled work day each semester, generally geared toward the removal of tree-infesting, invasive species, such as “Potato Busts” to remove *Dioscorea bulbifera*, the air potato vine

c. Campus tree inventory assistance (in progress)
3. Public Awareness

The second goal of the Florida Tech Tree Care Plan is to create relevance within the local community and promote public awareness of the University’s diverse, valuable campus forest by increasing transparency in facilities and grounds landscaping operations and promoting the recognition of Arbor Day. Additionally, Arbor Day will be an annual celebration and opportunity to bring Florida Tech’s trees to the forefront of the campus community consciousness.

4. Communication Strategy

After approval of the Florida Tech Tree Care Plan and Policies, the plan will be broadcast to the university community via the electronic mail distribution system and the plan will be available electronically on the web site of the Facilities Operations Department and the Office of Sustainability web site, as well as via social media. This plan will also be included in the Florida Institute of Technology Design Guidelines so that they will be available to Florida Tech project managers, designers and construction firms for including in project specifications.

Arbor Day Observance, third Friday in January

First Arbor Day Celebration, January 16th, 2013
Glossary

**Backfill** - Material used to refill an excavated area.

**Diameter Breast Height (DBH)** - The circumference of a tree 4.5 feet above median grade, DBH is the industry accepted standard for measurement.

**Canopy Tree** - A tree that will grow to a mature height of at least 40 feet with a spread of at least 30 feet.

**Drip Line** - A ring around the tree canopy on the ground level that receives most of the rainwater shed from the tree canopy. Feeder root locations go beyond the drip line to get moisture and nutrients being created from organic matter in and on top of the soil.

**Ecosystem Services** - Humankind benefits from a multitude of resources and processes that are supplied by ecosystems. Collectively, these benefits are known as ecosystem services and include products like clean drinking water and processes such as the decomposition of wastes. http://www.millenniumassessment.org/en/index.html

**Green space** - Any area retained as permeable unpaved ground and dedicated on the site plan to supporting vegetation.

**Hardiness Zone** - Zones showing a geographically-defined area in which a species of tree is capable of growing, as defined by the climatic conditions, including its ability to withstand the minimum temperatures of the zone.

**Hand-watering** – while seemingly obvious, actual hand-watering is more than just putting a hose to the trunk. To avoid runoff when using the hand-held hose, use a water wand or other nozzle that divides the spray into rain-size droplets. Some nozzles have built-in spray pattern adjustments.

- Apply 2 gallons of water for every inch of trunk diameter (measured at 4.5 feet above the ground) for each day between individual waterings.

  **Example:** a 10-inch diameter tree watered 3 days ago would need 60 gallons of water.

  Note: a typical garden hose can deliver 5 gallons of water per minute. Sixty gallons would take 12 minutes to apply. Distribute this amount of water under the crown of the tree.

- Apply survival-level water every three days, when it hasn’t rained, to recharge the soil water.

**Internode** - A part or space between two knots or joints.

**Integrated Pest Management** - (IPM) - An effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices including knowledge about the lifecycles of pests, relevance of weeds, and resistance of particular plants.
**Silt Fence** - A temporary sediment control device used on construction sites to protect water quality in nearby streams, rivers, lakes and bays from sediment in storm water runoff.

**Soil Compaction** - When soils are compacted, the total pore space in the soil is decreased. This adversely affects the soil in several ways. It reduces the ability of water to move through the soil so that during wet periods there is inadequate movement of oxygen to roots. During dry periods, compacted soils can become so hard that root systems cannot grow through the soil. The end results are trees with poor root systems and in time, can result in death of the tree.

**Tree Protection Zone** - The area surrounding a preserved or planted tree, usually extending beyond the canopy drip line, that is essential to the tree’s health and survival, and is protected within the guidelines of these regulations (see sidebar).

**Trenching** - The process of digging long, narrow channels in the ground for the purpose of laying pipes and wires during construction projects.

**Trunk Flare** - The base of a tree trunk where the root system begins. When planting, you should be able to see the part of the trunk where it spreads out to become roots above ground after backfilling (see below).

**How to Set Up a Tree Protection Zone:**

1. Measure the diameter of the tree trunk in inches at 4.5 feet from the ground. This is called the diameter breast height or DBH.

2. Multiply this value by 2.5. This result is the diameter of the root protection zone in feet. This is also considered the critical rooting distance.

For example, if an oak has a DBH of 20 inches, the tree protection zone is 50-feet in diameter (20 x 2.5). Another way to think about it is to protect an area extending 25 feet in all directions from the trunk.