

Urban Forestry Curricula for Undergraduates: Approaching Educational Values and the Profession

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Across the nation undergraduate urban forest management programs come in many forms. The variability among academic program curricula usually is derived from urban and non-urban forestry faculty's perceptions of the entry-level job market for graduates. In addition to institutional faculty, there are three primary national and international professional organizations which significantly influence urban forest management curricula. The perceptions of public sector natural resource decision makers, and private sector consultants and natural resource business interests also impact curricula.

This is a review paper of select influences affecting change in urban forestry curricula. The primary purpose of this paper is to examine university urban forestry programs and tally subject areas cited within undergraduate education. The final result is an appreciation of the diversity and commonality of academic programming for the profession's entry-level positions. The institutional product generated is a graduate with developed attributes and understandings to provide value and leadership to this amenity, eco-utility, and service profession.

SAF Accreditation

The Society of American Foresters (SAF) credentials forestry academic institutions which meet specific criteria for professional education. In many states and in many forestry job markets, a degree from a SAF accredited institution is essential to practice. In some states or jurisdictions the term "forestry" or "forest management" is a protected term available for use only under the umbrella of a state license, registration, certification or other official credential. Many of these credentials are tied to, or associated with, a SAF accredited degree program. The term "urban forestry" in practice is usually accepted as part of the general definition of forestry, and so is often regulated by state and local credentialing. Other states and jurisdictions define urban forestry as part of environmental horticulture, landscape management, or generic arboriculture, and therefore not subject to forestry credentialing. SAF accreditation helps define the components of forestry and urban forestry curricula.

ISA Certification

The International Society of Arboriculture (ISA) Certified Arborist (CA) credential is a worldwide, minimum competency, continuing education and testing program for professional arborists and urban foresters. Greater than twenty times more urban foresters in the United States hold the CA credential compared with a forestry credential. Many public sector, private sector, NGOs, and utility interests place professional credential requirements (specifically CA) into their contract specifications. Many jurisdictions and business interests demand professionals hold the CA credential in order to bid, perform and practice urban forest management and tree health care. The ISA certification program helps define what individuals need for professional credentialing.

ISA Job Analysis

ISA provides an important piece of information for examining subject matter priorities for both arborists and urban foresters. To maintain the viability and value of the CA credential, every five years the ISA Certification Board completes a major job analysis of credential holders, and those who may become credential holders and are otherwise involved in professional arboriculture and urban forestry. This survey goes to the commercial, municipal, utility, and education sectors of the arboriculture and urban forestry profession. This job analysis is used to identify specific subject areas and specific skills currently required within the profession. The prioritized listing of subject matters within the CA credential program is presented in Table 1.

ISA Entry Level Survey

ISA also has completed an entry-level survey (actually a job web) for professional tract arborists and urban foresters. The survey asked how each individual entered the profession and how they have progressed in their profession over time. This profession entry-point survey helps define where a student's first job might be and expectations of where they may be headed in the profession over their lives through entry, apprentice, journeyman, and senior professional levels. This survey provides direct job market entry information as well as a hint of subject matter requirements. Table 2 provides a summary of the profession entry-level survey results.

SMA Certification

The Society of Municipal Arborists (SMA), a professional affiliate of ISA, is an organization servicing professional municipal and county arborists and urban foresters. SMA is responsible for providing an advanced, voluntary, specialty certification program for professionals who already hold the CA credential, and have met specific educational and experiential criteria. The Municipal Specialist certification is earned and maintained through testing and continuing education credits. This specialty credential is specifically targeted at working, public sector, urban foresters, and their professional urban forestry consultants. As part of SMA's certification program, every five years a detailed job analysis is performed on certificants, and those who could become certificants, working in this area of the profession. The prioritized subject matter list for this certification program is given in Table 1. The SMA certification program helps define what individuals need for professional specialty credentialing.

Best, Emerging, & Static

Given the variability in urban forest management programs, due to both faculty perceptions and professional society credentialing, a quick survey of academic curricula was undertaken for the purpose of developing a consensus subject or course offering list and a prioritization of subject categories. The "best" urban forestry schools, colleges, universities, and institutions (based upon reputation within the profession) were identified and their curricula examined via their publically available web sites. The identifiers and key words used for this review of curricula were two professionally accepted terms "urban forestry" and "urban forest management."

After the best institutions were surveyed for specific curriculum items, a number of emerging academic programs from various institutions were surveyed. A few institutions deemed to be static within the profession were also included. Note the purpose of this review was not a comparative ranking of institutional quality. Additionally, this review was not a comprehensive dissection of every program's curriculum, but a sampling of commonality.

Curricula Forms

Institutional approaches to an urban forestry curriculum can be categorized into at least three forms:

- 1) one or two course modifications of a traditional forestry curriculum;
- 2) three to five course programs within traditional forestry or horticulture programs; or,
- 3) an independent curriculum specifically designed for urban forestry professionals.

The first curriculum form listed above is driven by the need of an institution to list urban forestry as a key word in its generation of educational products, and is usually a part of a traditional rural or production forestry program in both structure and function. Many institutions have chosen to only minimally invest in urban forestry regardless of their constituency's demands or demographics.

The second curriculum form above demonstrates a truly accelerating investment in urban forestry and a recognition of the growing role urban forestry plays in community natural resource management and the demands of the marketplace.

The third curriculum form results from institutional risk taking to fulfil a rapidly growing service economy's demand for hard science literacy and social science competency in a natural resource manager. These institutions are tracking the demographics of land ownerships, decision makers, and populations to craft viable programs of study which are in demand by students and by employers.

Academic Investment Gradient

The gradient across the three types of curricula (as listed above) actually begins with institutions not reviewed here which have no recognition of the ecological and sociological values of managing community environments in their academic products. There are many premium institutions without urban forestry which have chosen to invest, and have competitive advantages, in other areas of expertise, and so emphasize these within their resident instruction programs. Conservation biology, environmental restoration, city planning, and urban study programs (as well as many other programs) can all contain portions of urban forest management subject matters.

A small way removed along the curricula gradient from institutions without any recognition of urban forestry, are single elective course programs. Here the student must elect to seek enrichment and specialization. In some cases selecting a single course in urban forestry can provide a student with a specialty or emphasis recognition.

In the middle of the curriculum gradient are programs with a significant, multi-course urban forestry concentration, emphasis, or specialization. These programs could be listed as part of a minor, or rarely as a major.

At the top end of the curricula gradient are programs listed as majors within various natural resource academic units. The urban forestry major is the premium credential more student and employers are seeking in order to differentiate special intellectual skills of their students from students with general knowledge.

Between The Lines

It should be noted there is some ipolitically correct window dressing of web sites and curricula targeted at various audiences in an attempt to try and show non-dogmatic academic thinking. It is sometimes difficult to discern how intellectually forthright and effective some institutional curricula can be in preparing natural resource professionals for urban situations. Clearly most of the programs with the greatest recognition for quality have developed specific curriculum to hone undergraduates for the urban forestry profession.

Subjects & Courses

Table 3 is a list of academic subject areas (either single subjects, course titles, or compound / combined subjects) defined for urban forestry from any of 28 different educational institution (institutions surveyed are listed in Table 4). This information was derived from a web based search only, similar to what a student looking for a program of study would perform. Table 3 provides an alphabetical listing of subject matter or course-work in urban forestry followed by a number of institutions applying this requirement or recommended elective.

Note not all traditional forestry related courses were deemed a component of an urban forestry program. Only where traditional forestry courses were an integral component of the urban forestry program were these courses tallied. Also note course descriptions were consulted when subject area combinations are listed. Subject areas were lumped together if the course description showed they were attacking similar academic areas of study. Institutions with urban forestry programming which were not included here did not surface on multiple level web searches and professional site links. Non-inclusion here does not imply any concern with quality, but simply a lack of searchability or visibility on the internet during June and July of 2006.

Minor Majors?

The academic terms for various programs of study include major, minor, emphasis, track, option, concentration, specialization, and other types of program designations. These terms are loosely applied across institutions and do not represent the same amount of student investments at all institutions, especially terms used to represent programs below a university's major program area of study. These academic constructs do help form a hierarchy of program standing (i.e. prestige and recognition of value) for urban forest management inside an institution. Of the surveyed institutions from Table 4, the following terms (and number of institutions) were used to denote the relative status of urban forest management programs: option (7), major (5), specialization (4), concentration (3), certificate (3 -- part of either two or four year institutions), emphasis (2), minor (1), track (1), or simply listed as a series of available courses (1).

Subject Importance

Table 5 is a list of all the urban forestry related subjects gleaned from institutional curricula (as alphabetically listed in Table 3) placed in order of importance. Table 5 suggests those subjects or courses which faculties, and the academic administrative hierarchy which approve faculty recommendations, believed to be critical to the study of (and practice of) urban forest management. Table 5 could act as a guide in creation of a new curriculum, or in modifying or updating a current curriculum.

Idealized Curriculum

It is clear from examining the professional and academic information regarding undergraduate education in urban forest management that significant subject matter trends exist. The first five of the most important elements (from Table 5) would be a course in tree health, urban forestry, woody plant identification, arboriculture, and how humans sustain communities effectively. The sixth course listed in Table 5 actually represents tree growth and health from an abiotic standpoint, and may or may not have been included in the higher priority tree health and arboriculture courses, depending upon the institution. The next three (#7-#9) priorities represent practical knowledge of the field and the foundation for environmentally literate decisions.

All of the top nine subject areas listed in Table 5 are highly interrelated and intimately mixed among courses from each institutions. A cursory review of this type did not look at syllabi to determine actual content. There is a natural schism in the subject matter and among institutional emphasis. Some institutions concentrate

their curricula on management policy and administration (social aspects) while others concentrate upon ecological management and health (biological aspects). This split is leading to graduate programs which allow specialization, but need a similar foundation at the undergraduate level.

Table 5 lists an interesting and progressive list of subjects for urban forest management. All of these subject matter ideas can not be translated into one program of study at the undergraduate level. What is possible is to seek niche advantages in providing unique educational products which can be marketed to a changing undergraduate student marketplace.

Urban Forestry Canon

A few summary rules can be promulgated here based upon this review: 1) forest management is to silviculture what urban forest management is to arboriculture, knowledge of one being essential to the other; 2) tree identification alone (dendrology) is not adequate to professional performance in urban landscapes; 3) a tree health care or landscape health care approach is essential to the profession where the host is key, not pest minutia; 4) site quality and tree performance are strongly linked to human perceptions of quality of life and tree values; 5) urban infrastructures concentrate natural resources to sustain cities while urban forests concentrate ecological values to sustain life; 6) urban forestry graduates are expected to understand and be proficient in using both new technology and traditional tools; and, 7) urban forestry undergraduates must be prepared to utilize continuing education and credentialing over their professional lives for the greatest success.

Author context:

Professor, past SAF member in the urban forestry working group, past Georgia registered forester, one of the founders and then elected president of the Georgia Urban Forest Council, elected president of the nine state Southern Chapter of the ISA, appointed international CA test development committee and then appointed its world chairman for five years, competitively appointed under the Clinton administration to the National Urban and Community Forestry Advisory Council (NUCFAC) as one of two representatives for United States universities, invited tree health care trainer for the Smithsonian Institute, National Park Service, and White House grounds staff in Washington D.C., elected member of the international Certification Board of ISA, elected world president of the ISA (19,000 members), competitively awarded the international Education Award by ISA, initiated and have team taught an urban tree management course for undergraduates and graduate students in the Warnell School at the University of Georgia, numerous invited technical lectures given at regional, national and international conferences on urban forestry and tree health care, author of more than 400 publications on urban forestry, environmental issues, and tree health care issues.

Table 1: Prioritized listing of general subject areas covered in the International Society of Arboriculture (ISA) Certified Arborist (CA) program, and the ISA / Society of Municipal Arborists (SMA) Municipal Specialist (MS) program. Both prioritized lists were developed, and are updated, on an every five year basis by a job analysis survey process using a team of expert professionals as analysts.

ISA ñ Certified Arborist certification

subject	professional importance
Tree Biology	13.0%
Pruning	12.0%
Work Site Safety & Tree Climbing	11.5%
Tree Problems Diagnosis	11.0%
Tree Identification and Selection	9.5%
Tree Installation and Establishment	9.0%
Tree Risk Assessment	7.5%
Construction Preservation of Trees	7.0%
Soil and Water Concerns	6.5%
Tree Nutrition and Fertilization	5.5%
Cabling, Bracing, and Lightning Protection	4.5%
Trees, People, and the Environment	3.0%
total =	100%

SMA ñ Municipal Specialist advanced certification

subject	professional importance
Arboricultural Practices	25%
Program Administration	20%
Public Relations and Education	20%
Policy and Planning	15%
Communications	10%
Tree Risk Management	10%
total =	100%

Table 2: Summary data from the International Society of Arboriculture's (ISA) survey on entrance and progression through the profession of arboriculture and urban forestry.

(Source = International Society of Arboriculture's *Career Paths In Arboriculture*, CD format, 2003, Champaign, IL.)

- IA)** Profession Entry Points (no education / no credentials) for Urban Forestry & Arboriculture:* (commercial, municipal, and utility sectors)
 - ground worker labor
 - climber labor
 - right-of-way clearance labor
- IB)** Profession Entry Points (some additional education and advanced credentials**) for Urban Forestry & Arboriculture:*
 - park labor and supervisor
 - arboretum labor and supervisor
 - botanical gardens labor and supervisor
 - equipment manufacturing and sales
 - arboriculture / urban tree health services sales
- IC)** Profession Entry Points (advanced education) for Urban Forestry & Arboriculture:*
 - middle management as public sector urban forester
 - technical school instructor
 - utility urban forester / arborist
 - arboriculture / urban tree health services supervision and sales
 - university extension agent

- 2)** Career Development Paths (additional education and experience) for Urban Forestry & Arboriculture: (the primary mid-career professional positions)
 - commercial tree care company management;
 - tree care company owner
 - community college / technical school professor
 - municipal forester / arborist
 - public / government urban forester
 - utility urban forester / arborist
 - university extension faculty.

- 3)** Senior or Terminal Career Positions in Urban Forestry & Arboriculture:
 - tree business executive
 - urban forestry / arboriculture consultant
 - university researcher / educator.

* = entry level positions have been filled primarily by people with training, certification and/or degrees in urban and community forestry, landscape architecture, arboriculture, regional planning, ornamental horticulture, nursery management, woody plant health care, botany, and outdoor recreation.

** = *i.e.* Certified Arborist, pesticide certification, commercial drivers licence, and Certified Tree Worker credential.

Table 3: Alphabetical list of academic subjects (courses) covered within selected urban forest management curricula.

subject / course title - number of institutions (listed in Table 4)

Arboriculture	ñ 17
Ecological Anthropology, Urban Geography, City Planning, and Social Change	ñ 16
Ecological Basis for Natural Resource Management	ñ 12
Environmental Conflict Management, Communications, Group Process, Team Building, Leadership, and Planning	ñ 5
Fire Management & Ecology	ñ 2
Forest and Park Recreation & Tourism	ñ 6
Forest and Tree Health Care	ñ 23
Forest Mensuration and Biometry	ñ 3
Forest Resources Measurements	ñ 3
Human Dimensions of Urban Forestry & Urban Greening	ñ 7
International Urban Greening	ñ 2
Landscape Design & Management Specifications	ñ 12
Landscape Installation & Maintenance	ñ 11
Mapping, Remote Sensing, GPS & GIS for Natural Resources	ñ 8
Marketing & Public Relations	ñ 3
Natural Resources Policy, Law, Economics & Administration	ñ 11
Nursery Management & Tree Propagation	ñ 6
Quantitative Natural Resource Sampling & Decision Making	ñ 3
Silviculture	ñ 6
Small Business Management, Accounting, & Real Property Evaluation	ñ 7
Soils, Water, & Watershed Management	ñ 8
State & Local Government and Budgeting	ñ 3
Survey, Measurement, & Modeling for Environmental Analysis	ñ 3
Tree Biology, Nutrition, & Physiological Ecology	ñ 13
Tree Evaluation & Inventory	ñ 1
Turfgrass Management	ñ 4
Urban (Community) Forest Management	ñ 21
Urban Tree Management	ñ 7
Vertebrate Pest Management	ñ 1
Wildlife and Fisheries Management	ñ 6
Woody Landscape Plant Identification & Silvics	ñ 20
Student Skills:	
Professional Verbal Communications / Public Speaking	ñ 3
Technical Written Communications	ñ 3
Senior Project, Senior Thesis, Senior Seminar, Degree Project	ñ 3
Seminar / Special Topics in Arboriculture & Urban Forestry	ñ 3
Internship	ñ 1
Service Learning	ñ 1

Table 4: Schools, colleges, universities, and institutions offering an urban & community forest management program.

(total of 28 curricula reviewed)

institution name - (type of credential offered)

Auburn University - (Urban Forestry emphasis -- Forestry major)
 Blue Ridge Community College ñ (Arboriculture Certificate)
 California Polytechnics University ñ (Urban Forestry concentration -- Natural Resource Management major)
 Clemson University ñ (Urban Forestry minor)
 Fleming College ñ (Urban Forestry Certificate)
 Iowa State University ñ (Urban & Community Forestry option ñ Forestry major)
 KVL / SLU Universitiesí Nordic Masters ñ Denmark (Urban Forestry & Urban Greening Masters)
 Michigan State University ñ (Urban and Community Concentration ñ Forestry Major)
 Mississippi State University ñ (Urban Forestry Option ñ Forestry Major)
 Paul Smithís College ñ (Urban Tree Management major ñ AAS degree)
 Pennsylvania State University ñ (Urban Forestry Option -- Forest Science Major)
 Purdue University ñ (Arboriculture specialty and Urban Forestry specialty -- Forestry major)
 Southern Illinois University ñ (Urban Forest Management major)
 Southern University and A&M College ñ (Urban Forestry major)
 Texas A & M University ñ (Urban & Community Forestry Courses -- Forest Science Major)
 University of California Davis ñ (Urban Forestry option -- Environmental Horticulture & Urban Forestry major)
 University of Florida ñ (Urban Forestry specialization ñ Forest Resources and Conservation major)
 University of Georgia ñ Athens Campus (Multidisciplinary Undergraduate Certificate in Community Forestry)
 University of Illinois ñ (Urban Forestry option ñ Horticulture major)
 University of Massachusetts Amherst ñ (Urban Forestry / Arboriculture Track ñ Forestry Major)
 University of Minnesota ñ (Urban & Community Forestry Major)
 University of Missouri ñ (Urban Forestry concentration -- Forestry major)
 University of Washington ñ (Environmental Horticulture & Urban Forestry specialization -- Environmental Science & Resource Management major)
 University of Washington ñ (Wolfís Human Dimension Research Program)
 University of Wisconsin Stevens Point ñ (Urban Forestry Option -- Forestry Major)
 Virginia Technical University ñ (Urban Forestry Option -- Forestry Major)
 Warnell School of Forestry & Natural Resources, UGA ñ (Urban Forestry emphasis -- Forestry major)
 Wisconsin Mid-State Technical College -- (Urban Forestry Associates)

Table 5: List of academic subjects (courses) in prioritized order of importance based upon frequency of occurrence within selected urban forest management curricula.

(listed from most important (#1) to least important (#14))

	subject / course title
<u>#1</u>	Forest and Tree Health Care
<u>#2</u>	Urban (Community) Forest Management
<u>#3</u>	Woody Landscape Plant Identification & Silvics
<u>#4</u>	Arboriculture
<u>#5</u>	Ecological Anthropology, Urban Geography, City Planning, and Social Change
<u>#6</u>	Tree Biology, Nutrition, & Physiological Ecology
<u>#7</u>	Ecological Basis for Natural Resource Management Landscape Design & Management Specifications
<u>#8</u>	Landscape Installation & Maintenance Natural Resources Policy, Law, Economics & Administration
<u>#9</u>	Mapping, Remote Sensing, GPS & GIS for Natural Resources Soils, Water, & Watershed Management
<u>#10</u>	Small Business Management, Accounting, & Real Property Evaluation Human Dimensions of Urban Forestry & Urban Greening Urban Tree Management
<u>#11</u>	Forest and Park Recreation & Tourism Nursery Management & Tree Propagation Silviculture Wildlife and Fisheries Management
<u>#12</u>	Environmental Conflict Management, Communications, Group Process, Team Building, Leadership, and Planning Forest Mensuration and Biometry Forest Resources Measurements Marketing & Public Relations Turfgrass Management

(continued)

Table 5 (continued): List of academic subjects (courses) in prioritized order of importance based upon frequency of occurrence within selected urban forest management curricula.

(listed from most important (#1) to least important (#14))

subject / course title

- #13** Professional Verbal Communications / Public Speaking
Quantitative Natural Resource Sampling & Decision Making
Seminar / Special Topics in Arboriculture & Urban Forestry
Senior Project, Senior Thesis, Senior Seminar, Degree Project
State & Local Government and Budgeting
Survey, Measurement, & Modeling for Environmental Analysis
Technical Written Communications
- #14** Fire Management & Ecology
International Urban Greening
Internship
Service Learning
Tree Evaluation & Inventory
Vertebrate Pest Management