


URBAN FORESTRY AT VIRGINIA TECH

A syllabus-based review of collegiate arboriculture course content in the U.S.

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Introduction






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Introduction

- Is there demand for college-educated arborists?
 - O'Bryan et al. (2007):
 - 82,000 establishments
 - 160,000 workers (public & private sector)
 - \$8.8 B gross annual revenue (20% annual growth)
 - 2010–2011 Occupational Outlook Handbook:
 - 45,000 tree trimmers & pruners (2008)
 - 12,000 additional workers by 2018
 - McPherson (1984):
 - Surveyed arboriculture employers in Mountain West region
 - < 1/3 respondents desired arborist employees with a 4-year degree



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Introduction

- Is there demand for college-educated arborists?
 - Penn-Del Chapter (2001):
 - Surveyed arboriculture firms in local chapter
 - > 70% respondents felt that a B.S. degree was important for certain positions
 - Elmendorf et al. (2005):
 - “(T)he demand for arboriculture and urban forestry graduates remains high, and in many areas of the United States, demand exceeds the supply of available graduates.”
 - Advancements in tree care science
 - Sophistications in tree care technologies
 - Increasing public awareness of proper tree care

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Introduction

- What do we know about collegiate arboriculture education?
 - Comprehensively, not much
 - And not much recently
 - Elmendorf et al. (2005)
 - Where
 - When
 - How many
 - Why
 - What should be taught
 - What is being taught?

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Introduction

ARBORICULTURE AND URBAN FORESTRY EDUCATION IN THE UNITED STATES: RESULTS OF AN EDUCATORS SURVEY

By William Elmendorf¹, Todd Watson², and Sharon Lilly²

	Respondents in agreement (%)
Very important	
Tree planting	98
Tree pruning	97
Tree selection	95
Tree soil and water relations	93
Tree structure and decay identification	92
Plant insect identification	92
Tree identification	90
Preserving trees during construction	89
Tree risk management	88
Tree anatomy and physiology	88
Tree nutrition	85
Safe work practices	85
Ethics	84
Urban forest management	80

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Research Objectives

1. Identify topics being taught in undergraduate arboriculture courses
2. Rank the frequency of these topics in courses
3. Identify trends in arboriculture course content

Aim ~
Ascertain how well the content of collegiate arboriculture courses aligns with the expectations of employers and perceptions of educators




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Scope and Limitations

- U.S. collegiate arboriculture
 - 2-yr programs
 - 4-yr programs
- Courses only
 - Not curricula, programs, etc.
- Arboriculture courses only
 - Not urban forestry, etc.
- Course descriptions and syllabi only
 - Not a comprehensive course assessment
- Saying vs. doing
- Snap-shot in time




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Research Methods


Course Descriptions (2008)

- Reviewed 279 U.S. colleges offering degrees in forestry, horticulture, and related disciplines
- Identified 94 colleges offering a course with *arboriculture* in their title
- Compiled 109 course descriptions
- Reviewed course descriptions to identify instructional topics
- Tallied topic frequency




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2010-2011 Undergraduate Course Catalog and Academic Policies



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Colleges

- [Agriculture & Life Sciences](#)
- [Architecture & Urban Studies](#)
- [Engineering](#)
- [Liberal Arts & Human Sciences](#)
- [Natural Resources and Environment](#)
- [Pamplin College of Business](#)
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College of Natural Resources

Forest Resources and Environmental Conservation


3354 (HORT 3354): URBAN FORESTRY AND ARBORICULTURE
 A study of the uses, biology, ecology and silviculture of trees and forested green space in urban and urban-rural interface environments. Planning, planting, establishment, growth and development of urban trees, site assessment, individual tree condition assessment, and tree maintenance; special emphasis on energy relationships, soil physical and chemical properties, soil stabilization, and insect and disease problems that are related to existing and planned trees and forested areas. Lab provided practical experience in arboriculture and tree care practices. Pre: (2314, 2324) or (HORT 3326), (2H,3L,3C)

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Research Methods

Course Syllabi (2009)

- Contacted 96 colleges offering 109 arboriculture courses
- Requested syllabi from 73 instructors
- Received 68 syllabi from 59 instructors
- Itemized instructional topics based on topical keywords
- Classified topics as either major, supportive, or miscellaneous, and then tallied their frequency



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URBAN FORESTRY and ARBORICULTURE (FOR/HORT 3354)

<p>Instructor Dr. Eric Wiseman 228-B Cheatham Hall 540.231.5148 pwiseman@vt.edu Office Hours: 1:00 – 2:00 p.m. T/R; or by appointment</p>	<p>Course Composition 3 Credit Hours Lecture: (T/R) 11:00 – 11:50 Lab: (F) 10:10 – 12:45; 1:25 – 4:00 Location: 317A Cheatham Hall</p>
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Course Description
 This course is a survey of urban forestry and arboriculture. **Urban forestry** is the management of planted and naturally occurring trees in urbanized areas to improve and sustain the urban environment. **Arboriculture** is the art, science, and technology of selecting, establishing, and maintaining landscape trees. The purpose of this course is to develop competencies in the basic principles and practices of urban forestry and arboriculture. Upon successfully completing this course, students will possess basic knowledge and skills in the following areas:

- Urban Forest Structure, Function, and Value
- Urban Tree Biology
- The Urban Tree Environment
- Landscape Tree Selection and Establishment
- Landscape Tree Appraisal and Valuation
- Tree Disorder Diagnosis
- Plant Health Care
- Tree Preservation during Land Development
- Tree Maintenance
- Tree Risk Management
- Arborist Safety and Tree Climbing

Textbook
 Harris, R.W., J.R. Clark, and N.P. Matheny. 2004. *Arboriculture: Integrated Management of Landscape Trees, Shrubs, and Vines*. Fourth Edition. Prentice Hall. 578 pp.

Additional readings will be assigned from various sources as described in the course schedule.

Learning Assessments
 Student knowledge and comprehension of the course material will be assessed as follows:


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Results – Course Descriptions

107 Instructional Topics

Theme	Count
Know	11
Home	13
Manage	43
Related	28
Other	7
Orgs.	5


1) Getting to know trees 2) Giving trees a home 3) Managing trees	4) Related management concerns 5) Not just trees 6) Organizations & certifications
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Results – Course Descriptions


Instructional topics	Topic frequency in course descriptions (%)	Educator importance perception (%) ¹
Pruning/Training	59	97 2
Planting/Transplanting	48	98 1
Diagnosis/Pest control	42	92 5
Climbing/Rope work	38	73
Fertilization/Nutrition	32	85
Soil & water relations	28	93 4
Structure & decay ident.	28	92 5
Selection	23	95 3

¹Percentage of surveyed arboriculture and urban forestry educators who rated the instructional topic as “very important”. From Elmendorf et al. (2005).




Results – Course Syllabi

Major Instructional Topic	Topic Frequency in Course Syllabi (%)			P-value (H ₀ :)
	Overall	Four-year Programs	Two-year Programs	
Pruning	85	89	83	0.4970
Disorders	81	89	76	0.1730
Physiology/Biology	79	82	78	0.7320
Risks/Hazards	79	85	76	0.3393
Soils/Nutrition	75	78	73	0.6677
Planting	74	78	71	0.5193
Selection	62	63	61	0.8689
Climbing	57	59	56	0.7965
Water relations	56	59	54	0.6490
Preservation/Construction	53	59	49	0.3969
Safety	53	52	54	0.8839
Tools/Equipment	53	52	54	0.8839
Appraisals	32	37	29	0.5029
Benefits/Values of Trees	29	22	34	0.2910
Site assessment	28	30	27	0.8012
Careers	27	30	24	0.6318
Lightning protection	27	26	27	0.9342
Identification	21	0	34	0.0007
Surveys/Inventories	15	11	17	0.4970
Felling	13	7	17	0.2498
Certification	12	0	20	0.0145
Law/Legal issues	10	15	7	0.3195




Results – Course Syllabi

Major instructional topics	Supportive topics	Topic frequency in course syllabi (%)
Pruning		85
	ANSI	13
	Training/young trees	13
	Special techniques	10
	Power lines	2
Disorders		81
	Diagnosis	59
	Diseases	38
	Insects/Pests	37
	Plant health care	31
	IPM	15
	Treatment of	15
	Chemical application	10
	Mammals	3
	Turf conflicts	3
Risks/Hazards		79
	Cable/Brace	41
	Risk assessment	38
	Support Systems	21
	Hazard remediation	19
	Cavity treatment	9
	Wound repair	6
	Guying/Propping	2
Soils/Nutrition		75
	Fertilization	57
	Nutrients (management of)	37
	Soils (management of)	19



Results – Course Syllabi


Instructional topics	Topic frequency in course syllabi (%)
Business issues	9
Report writing/estimates	9
Appreciation for trees	7
History	7
Nursery practices	7
Organizations	6
Client relations	4
Ethical issues	4
Girdling roots/collar excavation	4
Professional skills development	4
Current topics	3
Grounds maintenance	3
Personnel management	3
Storm response/damage	3
Vertical/Radial mulching	3
Christmas tree production	2
Consulting	2
Fire management	2
Grafting/Budding	2
Literature awareness	2
Planter box bedding	2
Supervisory duties	2
Volunteer coordination	2
Windbreaks/Shelterbelts	2
Winterizing plants	2



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Discussion – Educational Alignment


- Arboriculture course descriptions tend to not communicate important instructional topics
 - 4 out of Elmendorf’s Top-5 were in < 1/2 of the course descriptions
- Arboriculture course syllabi more thoroughly communicate important instructionals topics
 - All of Elmendorf’s Top-5 were > 1/2 of the course syllabi and most were in over 3/4
 - Planting (#1 @ 98%) → 74% of syllabi
 - Selection (#3 @ 95%) → 60% of syllabi



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Discussion – 2-yr. vs. 4-yr. programs


- Arboriculture course content very similar between programs
 - No difference in frequency for 20/22 major topics
 - Tree Identification (0% vs. 34%)
 - Accelerated curricula vs. specialized courses
 - Certification (0% vs. 20%)
 - Differences in educational objectives and institutional missions



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Discussion – Course Content Trends


- Instructional topics encompass “cradle-to-grave” tree management
 - Greater emphasis placed on their care than on their demise
- Courses are well-founded in basic scientific principles
 - Tree Physiology, Disorder Diagnosis, Soils/Nutrition
- Arboriculture education is progressive
 - Plant Health Care (31%) vs. Chemical Application (10%)
 - Cavity Treatment (<10%) and Cavity Filling (0%)



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Discussion – Course Content Trends


- Greater emphasis on theory and concepts than on practice and application
 - Pruning (85%) → Equipment (53%) → Chainsaw (26%)
 - Practical skills in internships and practicums
- Safety is not well-emphasized in course descriptions and syllabi
 - Safety (53%); ANSI Z-133 (< 10%)
- Courses are preparing students for diverse careers
 - Tree Values & Benefits (29%)
 - Inventories and Surveys (15%)
 - Appraisals (32%); Law & Legal Issues (10%)



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Take Home Messages

- Based on course descriptions and syllabi, collegiate arboriculture course content is well aligned with educators' priorities
- Arboriculture course content is very consistent among 2-yr and 4-yr programs
- Opportunities exist to better communicate our course content in course descriptions
- Opportunities exist to increase emphasis on arboriculture safety
- New questions:
 - How well do we teach arboriculture?
 - How does learning translate to job performance?



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