



TOPIC: University of Maryland Eastern Shore: Bachelor of Science in Urban Forestry

COMMITTEE: Education Policy

DATE OF COMMITTEE MEETING: June 2, 2010

SUMMARY: The proposed program in Urban Forestry represents a new career degree and will be housed in the Department of Agriculture, Food and Resource Sciences (DAFRS). Urban foresters live and work in larger cities and manage urban trees. They are concerned with quality-of-life issues, such as air quality, shade, beautification, storm water runoff, and property values. According to the U.S. Bureau of Labor Statistics, federal, state, and local governments employ the majority of conservation scientists and foresters, and a large percentage of new jobs will be found in these areas. The federal government and some state governments expect a large number of their workers to retire over the next decade. As a result, there is likely to be a large number of job openings for foresters and conservation scientists in government. In general, workers with a four-year degree from an accredited university program, along with good technical and communication skills should have the best opportunities for entry-level work. Overall, the projected 2018 outlook for jobs in forestry is 12,900.

The primary objectives of the program are to provide academic and research professional training, experiential learning experiences via off-campus agency internship placements, off-site technical training, and job networking opportunities; to expose students to the use of state-of-the-art technologies such as geospatial sciences that will improve job skills and success in the workplace; and to prepare students for graduate study in urban forestry and allied disciplines. This program will be supported by existing curricula, a highly qualified professional faculty and support staff, a 120-acre forest in the University Research and Teaching Farm, and related support facilities.

The expected student learning outcomes have been aligned with those suggested in the Accreditation Handbook of the Society of Professional Foresters. These outcomes include the ability to understand molecular biology, cells, organisms, populations, species, communities and ecosystems and to evaluate soil properties and processes, hydrology, water quality, and watershed functions; demonstrate the ability to use basic approaches to and applications of math and statistics; understand human behavior and social and economic structures, processes and institutions of importance across a broad range of communities; and analyze ecological concepts and principles including the structure and function of ecosystems, especially the growth and performance of various tree species in urban/suburban settings, plant and animal communities common to urban forests.

ALTERNATIVE(S): The Regents may not approve the program or may request further information.

FISCAL IMPACT: No additional funding is necessary. The program will be supported through tuition, grants and as necessary reallocated funds.

CHANCELLOR'S RECOMMENDATION: That the Committee on Education Policy recommend that the Board of Regents approve the proposal from the University of Maryland Eastern Shore to offer the Bachelor of Science in Urban Forestry.

COMMITTEE RECOMMENDATION: Approval.

DATE: June 2, 2010

BOARD ACTION:

DATE:

SUBMITTED BY: Irwin Goldstein (301) 445-1992 irv@usmd.edu

UNIVERSITY SYSTEM OF MARYLAND INSTITUTION PROPOSAL FOR

- New Instructional Program
- Substantial Expansion/Major Modification
- Cooperative Degree Program

University of Maryland Eastern Shore

Institution Submitting Proposal

Urban Forestry Program

Title of Proposed Program

Bachelor of Science Degree
Degree to be Awarded

Fall 2010
Projected Implementation Date

011400
Proposed HEGIS Code

03.0508
Proposed CIP Code

**Department of Agriculture, Food &
Resource Sciences**
Department in which program will be located

Dr. Robert Dadson, Acting
Department Contact

410-651-6168
Contact Phone Number

rbdadson@umes.edu
Contact E-Mail Address

Shelma B. Thompson
Signature of President or Designee

Date

Mission

The proposed Bachelor of Science (B.S.) Program in Urban Forestry (subsequently referred to as "Program") provides the educational opportunity to prepare students, especially those from underrepresented minority groups and women, for employment and continued development of student research training in the disciplines of Agriculture, Food, and Resource Sciences.

UMES is a teaching, research, and doctoral degree-granting institution that nurtures and prepares leaders in a student-centered environment, particularly from among minorities and women. Committed to providing high quality programs in an ethnically diverse environment, the University prepares students who will serve and shape the global economy. UMES values and promotes the scholarship of faculty, discovery and dissemination of new knowledge, and applying that knowledge to the benefit of the extended community. The University recognizes its responsibility for developing human potential, enriching cultural expressions, and sharing its expertise with individuals, businesses, educational, governmental, and non-governmental organizations.

The proposed Program addresses the mission of the 2004 Maryland Higher Education Commission (MHEC) state plan for postsecondary education. The B.S. Program in Urban Forestry will expand academic course offerings and programs in the Department of Agriculture, Food and Resource Sciences (DAFRS). Specifically, the proposed Program will be congruent with Goals 2, 3, and 5 of the MHEC Maryland State Plan:

Goal 2 - Achieve a system of postsecondary education that promotes accessibility and affordability to/for all Marylanders.

Goal 3 – Ensure equal educational opportunity for Maryland's diverse citizenry.

Goal 5 – Promote economic growth and vitality through the advancement of research and the development of a highly qualified workforce.

A search of the MHEC data base showed that there was no other Urban Forestry program at any degree level in the state, so there is no duplication of effort.

Characteristics of the Proposed Program

This program represents a new career degree in Urban Forestry and will be housed in the DAFRS. This program will be supported by existing curricula, a highly qualified professional faculty and support staff, a 300 plus- acre University Research and Teaching Farm and related support facilities. At least two additional faculty members and seven new support courses will be required to implement this program at UMES.

Educational objectives of the Program

The proposed program in DAFRS will to:

- provide academic, and research professional training in Urban Forestry for a diverse student population
- provide experiential learning experiences via off-campus agency placed internships and departmental practicums for students
- provide on and off-site career technical training, and job networking opportunities for students
- expose students to the use of state of the art technologies (e.g., geospatial sciences) that will improve job skills and success in gainful employment in urban forestry and related disciplines
- prepare students for graduate study in urban forestry and allied disciplines.

Description of program as it would appear in the catalog

This proposed program seeks to provide a rigorous educational opportunity that will prepare students to implement the skills necessary to succeed in careers in urban forestry, as well as prepare them for entrance into graduate programs in Urban Forestry and allied disciplines.

General requirements for degree

All Urban Forestry majors will take 42 credit hours of General Education courses. Of these 42 credits, the six credits to satisfy emerging issues will be selected from the support courses. The Urban forestry degree program will require 15 credit hours of core courses, 47 credit hours of major courses, and 16 credit hours of support courses.

Total number of credits and their distribution

<u>Category</u>	<u>Distribution</u>
General Education Courses	42 credit hours
Core Courses	15 credit hours
Program Courses	47 credit hours
Support Courses	16 credit hours
<u>Total = 120 credit hours</u>	

List of courses by title and number (course descriptions for current programs can be found on page 12)

<u>A. General Education</u>		<u>42 credit hours</u>
ENGL 203	Fundamentals of Speech – Area I	3
Six credits from Art, History, Language or Literature – Area I		6
ECON 201/H	Principles of Economics I – Area II	3
Three credit hours from Behavioral Sciences – Area II		3
CHEM 111 and CHEM 113, CHEM 112 and CHEM 114 – Area III		8
MATH 110	Trigonometry and Analytical Functions or MATH 111 – Area IV	3
ENGL 101	Basic Composition I – Area V	3
ENGL 102	Basic Composition II – Area V	3
ENGL 305 Technical Writing or ENGL 310 Advanced Composition – Area V		3
ENGL 001/002	English Proficiency Exam – Area V	0
AGNR 111	Freshman Orientation – Area VI	1
Six credits from support courses – Area VI		6
<u>B. Core Courses</u>		<u>15 credit hours</u>
ANPT 114	Intro to Animal & Poultry Science	4
PLSC 184	Intro to Plant Science	3
PLSC 185	Intro to Plant Science lab	1
AGEC 213	Intro to Ag Economics	3
AGME 283	Engineering Principles Applied to Ag	3
AGRI 301	Ag Seminar	1
<u>C. Forestry Program Specific Courses</u>		<u>47 credit hours</u>
*NRES 333	Silviculture	3
HORT 333	Landscape Design Theory	3
SOIL 203	Intro to Soil Science	3
SOIL 204	Intro to Soil Science lab	1
*NRES 475	Urban Affairs and Planning	3
AGRN 423	Plant Nutrition & Soil Fertility	3
AGNR 323	Intro to Biostatistics	3
*NRES 474	Forest Mensuration	3
*NRES 151	Intro to Urban Forestry	3
*NRES 201	Dendrology	4
*NRES 433	Forest Ecology	3
ENTO 313	General & Applied Entomology or	
PLSC 321	Integrated Pest Management	3
PLSC 474	Plant Pathology	4
BIOL 111	Principles of Biology I	3
BIOL 113	Principles of Biology I lab	1
PLSC 484	Internship in Ag & Natural Resources	4
*PLSC 333	Plant Anatomy	3
*New courses		

D. Support Courses

16 credit hours

Students will select 16 credit hours from the list below:

AGRN 333	Weed Science	3
AGNR 353	Natural Resources Conservation	3
AGNR 483	Prin. of Geographic Information Systems	3
AGRN 463	Plant Genetics and Breeding	3
PLSC 283	Agriculture and the Environment	3
SOIL 443	Soil Chemistry	3
AGRN 499	Independent Study in Plant & Soil Science	3
PLSC 488	Plant Pathology	3
NRES 404	Conservation Biology	3
AGME 313	Agricultural Surveying Technology	3
HORT 388	Ornamental Plant Materials	3
HORT 353	Turf Mgmt and Maintenance	3
AGRI 499	Special Topics in Agriculture	3
BIOL 402	Ecology	3
BUED 212	Computer Concepts & Applications	3
CHEM 211	Fundamentals of Organic Chemistry I	3
CHEM 213	Fundamentals of Organic Chemistry I lab	1
MATH 112	Calculus	3
PLSC 489	Crop Physiology & Ecology	3
PLSC 488	Plant Propagation	3
PLSC 321	Integrated Pest Management	3
HORT 423	Horticultural Crops	3
HORT 313	Floriculture and Ornamental Horticulture	3
HORT 203	Introduction to Horticultural Science	3
SOCI 315	Urban Sociology	3
PHYS XXX	Course to be selected w/ advisor approval	3
ENVS XXX	Course to be selected w/ advisor approval	3
AMIC 324	Agricultural microbiology	4

Description of thesis and/or non-thesis option for graduate programs

Not applicable.

Expected student learning outcomes (SLO)

The desired SLO for the Urban Forestry program will be in line with those suggested by the Accreditation Handbook of the Society of Professional Foresters. Thus, students completing the above curriculum will:

- prepare and deliver effective oral presentations,
- exhibit proficiency in English (all students must pass the English Proficiency Exam) Composition/Technical Business Writing,
- read with comprehension a variety of documents, and critically evaluate opposing viewpoints,
- understand the components, patterns, and processes of biological and ecological systems,
- understand molecular biology, cells, organisms, populations, species, communities and ecosystems,
- understand physical and chemical properties, measurement, structure, and state of matter,
- demonstrate the ability to use basic approaches and applications of math and statistics,
- demonstrate the ability to address, moral, and ethical questions and the ability to use critical reasoning skills,
- understand human behavior and social and economical structures, processes and institutions of importance across a broad range of societies,
- exhibit skills in the use of computers and other contemporary electronic technologies,
- identify a wide range of woody plant species, including native forest species and introduced urban forest species, their growth and health in urban and suburban environments,
- evaluate soil properties and processes, hydrology, water quality, and watershed functions,
- analyze ecological concepts and principles including the structure and function of ecosystems, especially the growth and performance of various tree species in urban/suburban settings, plant and animal communities common to urban forests, diversity, and disturbance;

- demonstrate competency in arboriculture including an understanding of tree establishment and maintenance in urban settings, and an understanding of basic tools and equipment and their use,
- understand tree physiology and anatomy and the effects of climate, fire, pollutants, moisture, nutrients, genetics, insects and disease on tree and forest health and urban forest composition,
- evaluate urban wildlife, and their interactions with urban forest components,
- practice arboriculture and urban forestry in multiple cultural, physical and housing density settings,
- understand compartmentalization of decay in trees, defect development, tree failure patterns and tree structure evaluation,
- identify and place trees in an appropriate location relative to each other and relative to structures in an urban/suburban environment and evaluate the health and benefits of urban forests,
- measure, assess and make recommendations regarding the appropriateness and value of existing trees and urban forests,
- assess tree risk, health and value (appraisal),
- use statistical sampling methods to conduct and analyze inventory data to model future urban forest changes, assess green space, and monitor tree health,
- perform spatial analysis and utilize GIS and remote sensing tools/skills in urban-rural interfaces,
- apply appropriate appraisal methods to value urban trees taking into account species, site, landscape location, condition and market value,
- develop and apply prescriptions appropriate to management objectives, including methods of establishing and influencing the composition, growth, and quality of trees and urban forests and understand the impact of those prescriptions,
- analyze the economics, environmental, and social consequences of urban forest management strategies and decisions,
- develop management plans with specific multiple objectives and constraints,
- evaluate urban and land use planning including the fundamentals of site planning and landscape design,
- utilize basic accounting and business skills, including working with budget development and management,
- evaluate wildlife habitat management in urban environments, including habitat enhancement and wildlife pest management,
- understand processes and legal aspects of municipal policy formation,
- understand federal, state and local laws, ordinances and regulations relative to the practice of urban forestry,
- practice professional ethics and recognition of the responsibilities to adhere to ethical standards in urban forestry decision-making on behalf of clients and the public,
- communicate as an urban forestry professional,
- evaluate industry best management practices and the applicable federal, state and local guidelines and standards for safety and performance,
- understand the administration, ownership and organizational implications for urban forests under both private and public ownership, including appraisals.

Assessment tools used to determine successful attainment of SLO's: The seven additional Urban Forestry courses and the two new faculty members in conjunction with existing faculty and courses will provide students with the desired SLO's for this program. The assessment tools and applications used will be in concert with the assessment requirements for all degree programs as specified by the Office of the Vice President for Academic Affairs. Examples are as follows:

- departmentally developed senior exit exam,
- papers, oral/audio-visual presentations,
- practicums, and internships with forestry agencies.

Demonstrable quality of program faculty

In order to provide necessary expertise in Urban Forestry, two full-time faculty members will be added to existing agriculture faculty to teach seven new forestry related courses. Profiles for these new positions and current faculty are listed immediately below.

Two assistant Professor or associate professors, Forestry related areas.

These individuals will have a Ph.D. Degree in Forestry or a related area and have the capability to teach the seven new courses as described earlier. No recruitment or marketing of the program will begin until the program has been approved. The anticipated program implementation date is Spring 2011. Faculty and student recruitment will begin as soon as the program approval is received. In addition to the new positions, the following faculty members in the Department of Agriculture, Food & Resource Sciences are available to teach core and support courses for the proposed Urban Forestry program:

- **Allen, Arthur L. (Associate Professor, 1890 Associate Research Director)**, B.S., University of Arkansas at Pine Bluff; M.S., Oklahoma State University; Ph.D., University of Illinois-Urbana; Soil and Plant Physiology
- **Clarke, Maurice F. (Assistant Professor)**, B.S., Tuskegee University; M.Sc., University of Edinburgh; DVM, Tuskegee University
- **Cotton, Corrie P. (Research Assistant Professor)**, B.S., University of Maryland Eastern Shore; BLA, MLA, The Pennsylvania State University
- **Dadson, Robert B. (Professor)**, B.Sc., University of London; M.Sc., Ph.D., McGill University; Agronomy and Plant Breeding
- **Demissie, Ejigou, (Professor)**, B.S., M.S., Ph.D., Oklahoma State University; Agriculture Marketing, Management, and Int'l Trade & Development
- **Gong, Tao, (Assistant Professor)**, B.S., M.S., Harbin Institute of Technology, P.R. China; Ph.D., Middle Tennessee State University
- **Green, Bessie, (Research Associate)**, B.S., Salisbury State University; M.S., Ph.D., University of Maryland Eastern Shore; Marine, Estuarine and Environmental Science
- **Handwerker, Thomas, (Professor)**, B.S., University of Tennessee; M.S., Ph.D., Cornell University; Pomology
- **Harter-Dennis, Jeannine, (Associate Professor)**, B.S., M.S., Ph.D., University of Illinois; Poultry and Animal Nutrition
- **Hashem, Fawzy, (Research Associate Professor)** B.S., University of Ain Shams; M.S., University of Cairo; Ph.D., University of Cairo; Ph.D., University of Maryland College Park; Plant-microbe interactions, Biological control, Biological nitrogen fixation, and Agricultural & Environmental Microbiology.
- **Marsh, Lurline E., (Professor and Chairperson)**, B.S., University of the West Indies; M.S., Tuskegee University; Ph.D., University of Minnesota; Horticulture
- **Mollett, Theodore A., (Associate Professor)** B.S., Oregon State University; M.S., Ph.D., Purdue University; Dairy and Animal Physiology
- **Shorter, George S., (Assistant Professor)**, B.S., Maryland State College; M.S., Virginia State College; Ph.D., Iowa State University; Agriculture Education
- **Tubene, Stephan L., (Associate Professor)**, B.S., Institute Facultaire des Sciences Agronomiques de Yangambi; M.S., Alcorn State University; Ph.D., Kansas State University; Agriculture Economics

Student audience to be served by program and enrollment estimates

Students for this program will be recruited from high schools in the State of Maryland and other states. Other sources of students will be via the formulation of the popular 2+2 format with two-year degree Forestry Program granting institutions in the region such as Alleghany College of Maryland and others. Two Capacity Building Grants totaling \$400,000 for two funding cycles will be submitted to USDA to enhance the capacity and implementation of this program, especially in the areas of enrollment and scholarships. A permanent fund of \$75,000 from USDA McIntire-Stennis Funds will begin in Year 2.

Cumulative enrollment estimates are as follows:

<u>Year-1</u>	<u>Year-2</u>	<u>Year-3</u>	<u>Year-4</u>	<u>Year-5</u>
8	16	24	32	32

Impact on student's technology fluency

Students will demonstrate competency in technological fluency as prescribed by campuses of The University System of Maryland. Specifically, fluency attainment will be accomplished via the infusion of technological aspects in specific forestry and forestry related courses. Students will use present-day technological tools and applications, especially the geospatial sciences relative to solving real world problems through computer simulations and computer based formal presentations. The internet and other software resources will be utilized to conduct primary/secondary market research, statistical analysis and facilitate personal career development. State-of-the-art updated hardware and software exists in the DAFRS, Department of Natural Sciences, and Departments of Mathematics, Computer Sciences, and Engineering.

Library requirements

An array of library holding and supportive resources already exist to support programs in SANS which will provide the main support for this program. The UMES library is a part of the library infrastructure of the University System of Maryland. The Vice President for Academic Affairs will assure that additional institutional library resources are made available to meet the needs of the Urban Forestry program.

Facilities and equipment

The University of Maryland Eastern Shore owns a three hundred-acre Research & Teaching Farm. Within the UMES farm is a forest located adjacent to campus near the City of Princess Anne. The 120 acre forest is comprised primarily by loblolly pine (*Pinus taeda*). Red maple (*Acer rubrum*) and sweetgum (*Liquidambar styraciflua*) dominate the floodplain. Blackgum (*Nyssa sylvatica*), river birch (*Betula nigra*), black cherry (*Prunus serotina*), pin oak (*Quercus palustris*), willow oak (*Q. phellos*), persimmon (*Diospyros virginiana*), sycamore (*Platanus occidentalis*), and devil's walking stick (*Aralia spinosa*) are also represented in the riparian forest. Other hardwood species found growing in the forest include beautiful swamp chestnut oak (*Q. michauxii*), white oak (*Q. alba*), southern red oak (*Q. falcate*), water oak (*Q. nigra*), American beech (*Fagus grandifolia*), American holly (*Ilex opaca*), and flowering dogwood (*Cornus florida*).

The State of Maryland through the Maryland Department of Natural Resources also owns woodland property adjacent to UMES that could be used for urban forestry pedagogy if conditions were modified that would provide additional urban forestry experiential learning activities for students not available on the UMES owned farmland. We anticipate developing agreements with surrounding towns and cities, such as Princess Anne, and Salisbury and perhaps the National Arboretum. These and others will be ideal places for internship stations for enrolled students.

Additionally, UMES has many existing facilities that will support this program, including the following:

- Geosciences laboratories with assorted software (2)
- Various plant and soils teaching and research laboratories (4)
- University technology center
- Physical plant infrastructure (motor pool)
- Precision farming capabilities via the 4-year Engineering Degree Program
- Facilities in the Department of Natural Sciences (teaching and research laboratories)

Finance

Currently, the tuition for a full time in-state undergraduate student is \$2,056.00/semester and \$5,450.00/semester for an out-of-state graduate student. The mandatory University fees, per academic year, for an undergraduate student total \$1,930.00. It is anticipated that funds for equipment will be needed to implement the program. No new administrative staff, or support for present administrative staff is requested. The University of Maryland Eastern Shore will seek to enter a specific cooperative agreement with the United States Department of Agriculture under the authority of 7 USC 3318(b). The purpose of the agreement is to support mutually beneficial cooperative research and scientific exchanges between the USDA Forest Service and university personnel in the areas of urban forestry. Each party is independent, has its respective responsibilities, and yet recognizes the need to coordinate through a federal and state partnership for the successful delivery of a Forestry Science degree program. It is expected that the personnel from the federal agency (USDA-FS) will serve as the two FTE faculty to teach the new forestry related courses, and support the forestry activities to grow the program. This will include internship, research and outreach efforts. The cost sharing (i.e., direct salary costs) is worked out between the two agencies involved in the Intergovernmental Personnel Act Mobility Program (IPA) at the time the program is approved. McIntire Stennis is a formula grant and the funds are guaranteed for UMES. In addition, the USDA funds are separate from the 1890 USDA Capacity-Building Grants referenced on page 6. In-kind contributions include office space, use of university facilities (i.e., university farm and forest), and use of specialized equipment.

TABLE 1: RESOURCES

Resources Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1. Reallocated Funds*	\$0	\$0	\$0	\$0	\$0
2. Tuition/Fee Revenue	\$61,912	\$123,824	\$187,736	\$247,648	\$247,648
a. #F.T Students	8 (8 new)	16 (8 new)	24 (8 new)	32 (8 new)	32 (8 new)
R=MD Resident	R=6	R=12	R=18	R=24	R=24
NR=Non-Resident of MD	NR=2	NR=4	NR=6	NR=8	NR=8
Annual Tuition/Fee	R=\$24,672	R=\$49,344	R=\$74,016	R=\$98,688	R=\$98,688
R=\$4112/year	NR=\$21,800	NR=\$43,600	NR=\$65,400	NR=\$87,200	NR=\$87,200
NR=\$10,900/year	Fee=\$15,440	Fee=\$30,880	Fee=\$46,320	Fee=\$61,760	Fee=\$61,760
Fee = \$1930/AY					
c. Annual Full Time Revenue	\$61,912	\$123,824	\$187,736	\$247,648	\$247,648
d. # Part Time Students, Credit Hour Rate, and Annual Credit Hours	0	0	0	0	0
g. Total Part Time Revenue	\$0	\$0	\$0	\$0	\$0
3. Grants, Contracts, & Other External Sources **	\$185,446	\$190,891	\$216,337	\$156,337	\$136,337
4. Research Lab Fees	\$0	\$0	\$0	\$0	\$0
TOTAL (Add 1 - 4)	\$247,358	\$314,715	\$404,073	\$403,985	\$383,985

*Existing funds will be reallocated for the difference of the balance of funding received.

**A total of 30% of the state's allocation of McIntire-Stennis funds will be transitioned to UMES by the year 2013. As per the USDA recommendation, this represents a 10% per year transfer beginning FY2011. (Year 1 includes 10% of \$254,456, Year 2 includes 20% of the funds, and Years 3-5 include 30% of the funds.) In addition, 1890 USDA Teaching Capacity Building grants will be sought (\$80,000 for Years 1 and 4; \$60,000 Years 2, 3 and 5) to enhance and implement the program. Finally, UMES has applied for a Wilson H. Elkins Professorship that will tentatively account for \$80,000 for Years 1-3 of the program.

TABLE 2: EXPENDITURES

Expenditure Categories	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
1. Total Faculty Expenses**	\$0	\$0	\$0	\$0	\$0
2. Total Administrative Staff Expenses	\$0	\$0	\$0	\$0	\$0
3. Total Support Staff Expenses	\$0	\$0	\$0	\$0	\$0
4. Equipment	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
5. Library	\$250	\$250	\$250	\$250	\$250
6. New or Renovated Space	\$0	\$0	\$0	\$0	\$0
7. Other Expenses	\$0	\$0	\$0	\$0	\$0
TOTAL (Add 1 - 7)	\$10,250	\$10,250	\$10,250	\$10,250	\$10,250

** Personnel on IPA's from USDA Forest Service.

Note: An IPA is often used by the Federal government on a temporary basis. Technically, a person funded through an IPA is on a temporary assignment from an IPA eligible organization, such as a state or local government, institution of higher education, or other eligible organization. By temporarily assigning someone to a new position, rather than that person leaving a current job to take a new one, the employee's employment is uninterrupted, allowing the employee to continue to accrue years of service or tenure. This has implications for retirement packages, pay increases, etc. Such assignments are usually for two years, but can be extended beyond the two years.

CURRICULUM GUIDE FOR URBAN FORESTRY PROGRAM

FRESHMAN YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 101/H	3	ENGL 102/H	3
MATH 110 or MATH 111	3	NRES 151	3
PLSC 184	3	BIOL 111	3
PLSC 185	1	BIOL 113	1
AGNR 111	1	CHEM 112	3
CHEM 111	3	CHEM 114	1
CHEM 113	<u>1</u>	GEN Curr. Area I	<u>3</u>
	15		17

SOPHOMORE YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ANPT 114	4	SOIL 203	3
ENGL 203	3	SOIL 204	1
PLSC 333	3	AGME 283	3
NRES 201	4	NRES 475	3
Support course	<u>3</u>	NRES 333	3
	17	ECON 201	<u>3</u>
			16

JUNIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
ENGL 305 or ENGL 3103		AMIC 324	4
AGEC 213	3	HORT 333	3
AGRN 423	3	NRES 474	3
AGNR 323	3	GEN Curr. Area II (Behavior Sc.)	<u>3</u>
GEN Curr. Area I	<u>3</u>		13
	15		

SENIOR YEAR

<i>First Semester</i>	<i>Credit</i>	<i>Second Semester</i>	<i>Credit</i>
AGRI 301	1	PLSC 484	4
NRES 433	3	Support courses	<u>10</u>
ENTO 313	3		14
PLSC 474	3		
Support courses	<u>4</u>		
	14		

Total Credit Hours: 120

Urban Forestry - Descriptions and Credits for New Courses.

(NRES 151) Introduction to Urban Forestry - (3 credits) This course involves learning about the care and management of tree populations in urban settings for the purpose of improving the urban environment. Lecture 2 hours, laboratory 2 hours. Prerequisites: PLSC 184 and PLSC 185.

(NRES 333) Silviculture - (3 credits) This course involves understanding the science, and learning how to manage and handle forest trees with respect to human objectives. Lecture 2 hours, laboratory 2 hours. Prerequisites: NRES 151.

(NRES 201) Dendrology- (4 credits) This course involves the identification of selected woody plants, including trees, shrubs and woody vines. Emphasis is on species of the northeastern United States. Lecture 3 hours, laboratory 2 hours. Prerequisites: PLSC 184 and PLSC 185.

(NRES 474) Forest Mensuration - (3 credits) This course is to develop basic knowledge and skills in urban forest resource inventory topics including tree content estimation, forest sampling, and stand yield prediction. Lecture 2 hours, laboratory 2 hours. Prerequisites: NRES 151.

(NRES 433) Forest Ecology - (3 credits) This course is a comprehensive analysis of the distribution, structure, and dynamics of forest ecosystems. Topics include paleoecology of forests, ecophysiology of forest trees, disturbance, succession and community analysis, primary productivity, and nutrient cycling. Lecture 2 hours, laboratory 2 hours. Prerequisites: PLSC 184 and PLSC 185, NRES 151.

(PLSC 333) Plant Anatomy - (3 credits) This course involves the use of preparation and viewing methods for studying plant anatomy. It involves understanding the complexity of tissue organization that exists within plant bodies to allow plants to develop and live as integrated organisms in diverse environments. Lecture 2 hours, laboratory 2 hours. Prerequisites: PLSC 184 and PLSC 185.

(NRES 475) Urban Affairs and Planning - (3 credits) This course is to develop basic knowledge and understanding of the complexity and diversity of the urban environment, and the policy and management processes that affect it. Lecture 3 hours.

Urban Forestry – Descriptions and Credits for Current Courses

AGEC 213/H Introduction to Agricultural Economics **Credit 3**
Students will learn economic concepts, definition and scope of agricultural economics, business organizations in the food and fiber system, factors of production and their characteristics, market equilibrium analysis, and the role of price elasticities of demand and supply. Prerequisite: ECON 201.

AGME 283 Engineering Principles Applied to Agriculture **Credit 3**
The application of engineering principles to problems in soil and water conservation, agricultural power units, machinery, agricultural electricity, structures, and animal environments will be studied. Material handling and processing of agricultural products will also be covered. Two hours lecture and two hours lab per week.

AGME 313 Agricultural Surveying Technology **Credit 4**
In this course engineering principles and theory of surveying, care and use of surveying equipment, measurement of horizontal distances and angles, differential and profile leveling, topographic surveying, mapping, field notes and area measurement computation methods are examined. Two hours lecture and four hours lab per week.

AGNR 353 Natural Resources Conservation **Credit 3**
Students enrolled in this course are provided the principles of soil, water, sediment, and nutrient conservation and management. Application of the principles of land use, run-off and erosion control, and soil management practices including elements of the universal soil loss equation, are also discussed. Prerequisite: PLSC 184 and PLSC 185 or permission of instructor.

- AGNR 483 Principles of Geographic Information Systems Credit 3**
 This course is designed to provide students with an overview of the applicability and use of Geographic Information Systems (GIS); students will become competent with ArcView[®], a GIS software package from Environmental Systems Research Institute (ESRI), Inc. Students will also learn the basics of data management, data accuracy, spatial analysis, and data presentation. Prerequisite: Sophomore standing. Two hours lecture and two hours lab per week.
- AGRI 301 Agriculture Seminar: Professional Development Credit 1**
 This course is an individualized preparation for entry into a professional career in agriculture. The course is to be taken during the spring semester of the junior year. Skills such as resume writing, interviewing for employment, and developing a professional image will be emphasized. The organization of information and the presentation of technical data through oral and written communication skills will be stressed. Prerequisite: ENGL 203 or permission of instructor.
- AGRI 499 Special Topics in Agriculture Credit 3**
 Students conduct research with faculty on prearranged topics. Prerequisite: Permission of instructor.
- AGRN 333 Weed Science Credit 3**
 Weed identification, and action of herbicides, physical, biological, chemical and cultural weed control are covered. Safe use, handling and management of pesticides, including preparation for Maryland Certification, will also be emphasized. Two hours lecture and two hours lab per week.
- AGRN 423/H Plant Nutrition and Soil Fertility Credit 3**
 This course provides an advanced study of the interrelationships between soil type, mineralogy, pH, soil nutrients, and other nutritional aspects related to plant growth, development and production. The availability and supply of micro and macro nutrients in soil, as affected by the environment, and the use of organic and inorganic fertilizers on plant growth and nutrition will be a major focus. Prerequisites: PLSC 184, PLSC 185 and SOIL 203 or permission of instructor. Cross-listed with AGRN 653.
- AGRN 463 Plant Genetics and Breeding Credit 3**
 This course deals with principles of plant genetics, cytological and genetic variation in crop plants, production and control of such variation in developing varieties and hybrids, crop improvement using biotechnology, methods of breeding self- and cross pollinated crops, and production and maintenance of high quality seeds. Prerequisite: PLSC 184 or permission of instructor. Three hours lecture per week.
- AGRN 499 Independent Study in Plant and Soil Science Credit 1-4**
 This course is designed for students with an interest in pursuing independent research topics in the plant and soil sciences. Prerequisite: Permission of instructor.
- AMIC 324 Agricultural Microbiology Credit 4**
 Instruction includes lectures and laboratories which apply general principles of microbial ecology, food microbiology, pathogenic microbiology and industrial microbiology as they directly relate to practical applications in the Agricultural Sciences. Prerequisites: BIOL 111, CHEM 111 or permission of instructor. Three hours lecture and three hours lab per week.
- ANPT 114/H Introduction to Animal Science Credit 4**
 This course is an introduction to the interspecies survey of principles through scientific animal production including breeding and genetics, reproduction, nutrition, animal management, and the importance of animal products to consumers. Three hours lecture and three hour lab per week.
- ENTO 313 General and Applied Entomology Credit 3**
 This course consists of lectures and laboratory exercises that focus on biology, taxonomy, and management of insects. The fundamentals of integrated pest management will also be covered.
- HORT 203 Introduction to Horticultural Science Credit 3**
 This course is designed to introduce the scientific principles and practices of horticulture as a scientific discipline. Plant relationships, structure, growth and development, as well as the artistic aspects will be discussed. The course is divided into three sections: 1) basic concepts and processes in plant science, 2) general managerial practices of horticultural crops, and 3) discussions of current topics in horticulture.

HORT 313 Floriculture and Ornamental Horticulture **Credit 3**
This course is an introduction to the concepts of ornamental plant production and floral design. It includes production, propagation, harvesting and marketing of ornamental plants. Previously listed as HORT 312. Two hours lecture and two hours lab per week.

HORT 333 Landscape Design Theory **Credit 3**
Students learn theory and principles of design, role of the environment in selecting plants and landscape materials, and basic graphic elements. Two hours lecture and two hours lab per week.

HORT 353 Turf Mgmt. and Maintenance **Credit 3**
This course shows students how to identify, select, establish and manage turf for commercial, recreational and residential use. Management factors such as renovation, drainage, irrigation, fertility, pest and disease control, as well as mowing and other maintenance procedures will be covered. Prerequisites: PLSC 184, PLSC 185 and SOIL 203 or permission of instructor. Two hours lecture and two hours lab per week.

HORT 388 Ornamental Plant Materials **Credit 3**
The main goals of this course are to present an overview of selected annual, herbaceous and woody perennials that grow in Delaware/Maryland/Virginia area. The course will include the identification of ornamental annual bedding plants, herbaceous perennials, woody trees and shrubs that will thrive in the planting area of USDA Zone 7 and the Plant Heat Zone 6 & 7. During the course the students will have the opportunity to receive the planting requirements of selected plants including soils, light and fertility. Written descriptions and visuals will aid in the students understanding of the selected plants. Campus tours of the existing plantings will also be used to increase the students' knowledge of selected plant materials.

HORT 423 Horticultural Crops **Credit 3**
This course presents the scientific aspects of commercial fruit and vegetable production. Principles of economics and practices in the global marketing of vegetables, fruits and nuts are discussed in relation to the maintenance of a safe food supply. General aspects of regional vegetables and fruits are given special emphasis for the Delmarva Peninsula. Prerequisite: HORT 203 or permission of instructor. Two hours lecture and two hours lab per week.

NRES 404 Conservation Biology **Credit 3**
The course is an introduction to the principles of conservation biology, with an emphasis on application of ecological principles, management tools and case history studies related to conservation issues. Prerequisite: BIOL 402 or equivalent. Cross-listed with BIOL 404.

PLSC 184/H Introduction to Plant Science **Credit 3**
This course provides an introduction to fundamental biological principles as they relate to plant growth, reproduction and development, interaction of plants with their environment, and importance of plants to society, with specific reference to the role of plants in Maryland's economy. Impact of crop production practices on other natural resources will also be discussed.

PLSC 185 Introduction to Plant Science Lab **Credit 1**
This course deals with laboratory and field studies of plants, and related processes, including photosynthesis, nitrogen fixation, reproduction, classification, genetic variability, weed control and tillage practices. Co-requisite: PLSC 184.

PLSC 283 Agriculture and the Environment **Credit 3**
This course examines the impact of agricultural practices on humans and our natural resources. Emphasis is placed on providing and maintaining an adequate food supply while protecting the environment.

PLSC 321 Integrated Pest Management Credit 3

This course is designed as an introduction to insect pests, disease causing organisms, weeds, and their management in crop plants using integrated practices. Topics will include classification, identification, biology, ecology, sampling methods, IPM development, management tactics, use of conventional pesticides, biological control, host plant resistance and legislative methods. It will also include biology and management of important insects, diseases and weeds in selected crops. The course meets for two lectures and for a two hour laboratory per week. Prerequisites: PLSC 184 and PLSC 185.

PLSC 474/H Plant Pathology Credit 4

This course examines causes of diseases in agronomic and horticultural crops, to include symptom recognition, isolation and enumeration, and management of diseases in landscape and field crops. Lab exercises include preparation of a journal-type manuscript based on an individual research project. Prerequisites: PLSC 184 and PLSC 185 or permission of instructor. Cross-listed with PLSC 674. Three hours lecture and three hours lab per week.

PLSC 484 Internship in Agriculture and Natural Resources Credit 3-6

This course involves supervised work experience in an approved setting that is planned with a business, university, or government agency. A faculty advisor must pre-approve the internship opportunity. Prerequisite: Permission of instructor.

SOIL 203 Introduction to Soil Science Credit 3

This course engages students in a study of soil forming factors, soil forming processes and minerals involved in soil development, weathering, soil physical and chemical properties, organic matter mineralization, and the impact of these factors on soil fertility, soil moisture holding ability, and pH. Prerequisites: CHEM 111 and CHEM 113 or permission of instructor. Three hours lecture per week.

SOIL 204 Introduction to Soil Science Laboratory Credit 1

This course will provide students with individual and group dynamic approaches to laboratory exercises that will be designed for students to acquire knowledge, comprehend, apply, analyze, synthesize, and evaluate aspect of soil profile development, soil forming factors, minerals, weathering, soil physical properties, chemical properties, organic matter mineralization, soil chemistry, and the impact of these factors on soil fertility, soil moisture content, and soil hydrogen ion concentration. Prerequisite: CHEM 111 and CHEM 113 or permission of instructor. Co-requisite: SOIL 203.

SOIL 443 Soil Chemistry Credit 3

This course provides students with knowledge of the chemical composition and formation of soils, knowledge of cation and anion exchange, soil acidity, soil alkalinity, soil salinity, soil conditions, and soil fixation of nutrients. Chemical methods of soil analysis are studied with emphasis on their relation to fertilizer requirements. Prerequisites: CHEM 112, CHEM 114 and SOIL 203.

AGNR 323 Introduction to Biostatistics Credit 3

This course is designed as an introduction to the use of statistics in research in the various disciplines in Agricultural, Environmental and Natural Resource Management. Topics will include populations and sampling, descriptive statistics, graphing data, normal vs. non-normal distributions, probability, developing hypotheses, parametric and non-parametric methods of analysis, t-test and analysis of variance and linear regression. Emphasis will also be put on written interpretation of data and report writing. Prerequisites: MATH 109 or equivalent.

PLSC 488 Plant Propagation Credit 3

The course emphasizes the principles and current techniques involved in propagating different types of plants using seeds and various vegetative structures. Students will gain practical experience in propagating plants.

PLSC 489 Crop Physiology & Ecology Credit 3

This course involves in depth discussion of ecological factors affecting crop growth, development and productivity. Students will learn about the basic ecophysiological principles and processes governing the functioning of crop systems in relation to their environment; learn about the biotic and abiotic factors affecting the ecophysiological processes of crops to ensure optimum yield and quality of crop plants; understand the importance of ecophysiological processes in crop production; learn how to evaluate the interaction of environmental factors and cropping systems on the physiological efficiency of crop plants; be able to identify stress, determine causal factors and processes, and develop strategies for stress abatement; and be able to locate/read/understand scientific articles related to plant physiology and ecology.

MATH 112 Calculus I Credit 4

This course covers differential calculus of functions of one variable, graphing, and differentiating algebraic and transcendental functions. It also covers limits, continuity, and Mean Value Theorem and applications, as well as maximizing and minimizing functions, related rate, and approximation applications. An introduction to integration is also included. Prerequisites: MATH 110 or MATH 111H with a grade of at least "C" or four years of high school mathematics (including Algebra I, Geometry, and Trigonometry) plus permission of the Department (obtained by receiving a satisfactory score on the placement test).

BUED 212 Computer-Concepts/Applications I Credit 3

The course introduces students to electronic information processing. Emphasis is placed on various computer concepts and applications. Contemporary computer software including System Software, and Application Software for word processing, spreadsheets and databases relevant to business and industry are taught. Not Open as Free or Program Elective.

SOCI 315 Urban Sociology Credit 3

A sociological analysis of the development and effects of modern urbanization of human institutions, population trends, and social relationships is presented. The role of social agencies, and elements making for organization and disorganization, urban planning and redevelopment are reviewed. Prerequisites: SOCI 101, SOCI 201, OR SOCI 311.

BIOL 402 Ecology Credit 4

This course is designed to provide the student with a study of the basic interrelations of plants and animals with physical and biotic factors of the environment. Prerequisites: BIOL 111/111H (grade of C or higher), and BIOL 112/112H (grade of C or higher). BIOL 211/213 is recommended. This course is comprised of two hours of lecture, one hour of discussion, and three hours of laboratory per week. The laboratory fee associated with this course is \$25.00.

BIOL 111/H Principles of Biology I/Honors Credit 3

This course is an introduction to the basic concepts of biology, with emphasis on molecular, cellular and genetic concepts related to living organisms. Basic concepts are considered, and major topics deal with (1) organization of cells and the molecular basis of life, (2) energetics and, metabolism, (3) cell growth and reproduction, and (4) genetics. This course is for Natural Sciences majors and others in the related sciences. Co-requisite: BIOL 113/113H. This course is comprised of three hours per week and one-hour discussion for the Honors section only.

BIOL 113/H Principles of Biology I Lab/Honors Credit 1

This laboratory course is designed to accompany BIOL 111/111h and to reinforce the basic biological concepts of cellular biology, molecular biology, and Mendelian and molecular genetics discussed in the corresponding lecture. Supervised laboratory sessions enhance the student's skills in experimental manipulation, data collection, data interpretation and analysis, and data presentation in an effort to stimulate logical thinking and scientific reasoning. Co-requisites: BIOL 111/111H (grade of C or better). The laboratory fee associated with this course is \$25.00.

CHEM 211/H Fundamentals of Organic Chemistry I/Honors**Credit 3**

Topics presented in this course include molecular structure, isomerism, and stereochemistry. The chemistry of alkanes, alcohols, ethers, alkenes, and aromatic hydrocarbons will also be discussed. Interpretation of spectra of major functional classes will be explained. Three hours of lecture, a one-hour discussion, and one three-hour lab (see below) must be taken concurrently. Prerequisite: The successful completion of CHEM 111/111H and CHEM 112/112H. Pre or Co-requisite: CHEM 213/213H or consent of instructor.

CHEM 213/H Fundamentals of Organic Chemistry I Lab/Honors**Credit 1**

This course is the laboratory part of the CHEM 211/211H. This course covers the practical application of theory presented in the lecture. Laboratory record keeping, neatness, laboratory notebooks, manipulation of common laboratory glassware, and safe practice and handling of chemicals will be stressed. Analysis of preparations by UV-Vis, FTIR, NMR etc., will be done. Careful recording of laboratory data and its interpretation will be covered. The lab period will be a three-hour session. Pre or Co-requisite CHEM 211/211H or consent of instructor. Laboratory Fee: \$25.00.