

Forest Science

2012-13 Student Handbook

Ecosystem Science and Management

College of Agricultural Sciences

The Pennsylvania State University



<http://ecosystems.psu.edu/>

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Ecosystem Science and Management Department

The Ecosystem Science and Management Department is an academic unit in the College of Agricultural Sciences at Penn State. Our mission is to provide educational opportunities and science-based information to protect, manage, and use natural resources for sustained benefits. This is accomplished through educational, research, and service programs in forestry, wildlife and fisheries, wood products, soils, water, and related areas.

The Ecosystem Science and Management Department offers two associate in science (A.S.) degree programs: Forest Technology (at Penn State Mont Alto) and Wildlife Technology (at Penn State DuBois); and three bachelor of science (B.S.) degree programs: Forest Science, Wildlife and Fisheries Science, and Wood Products. A minor in each of these latter three areas is also offered, as is a minor in Environmental Soil Science. In addition, we offer graduate programs at both the master's and doctoral levels. We are committed to quality teaching.

Undergraduate Programs Office

The Ecosystem Science and Management Undergraduate Programs Office is housed in 113 Forest Resources Building at Penn State University Park; phone (814) 865-4237. Dr. Paola Ferreri is the associate director for academic programs, Ms. Ellen Manno is the program coordinator, and Ms. Dana Grove is the staff assistant.

Each student in the Ecosystem Science and Management Department is assigned an academic adviser. For students at the University Park campus, advising assignments are made by the Ecosystem Science and Management Undergraduate Programs Office.

Any student enrolled in, or thinking about enrolling in, a major in the Ecosystem Science and Management department, regardless of campus location, is encouraged to contact the Ecosystem Science and Management Undergraduate Programs Office for additional information. Additional information regarding our academic programs, scholarships, student activities and professional societies, faculty, and facilities is available on our website: www.ecosystems.psu.edu.

Undergraduate Programs Office
Ecosystem Science and Management
The Pennsylvania State University
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University Park, PA 16802-4301
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How to Use this Handbook

This handbook is a tool to help you plan your academic career and meet all of the requirements for the bachelor of science degree in Forest Science (FORSC). This handbook is not intended to replace regular meetings with your academic adviser. Because the requirements for graduation for future students can be revised at any time, to keep track of the requirements that you must meet in order to graduate you must know both your general education year and your program year. Your program year is the year that you declared your major in FORSC. This differs from your general education year, which is the year you entered Penn State as a degree student. This handbook refers to the general education and program requirements for 2012-2013. You should use the Baccalaureate Degree Programs listing online to determine your general education requirements: <http://bulletins.psu.edu/bulletins/bluebook/>. For example, the average freshman student entering Penn State in the fall of 2012 will not declare a major until 2014. Thus, this student's general education year is 2012 and his/her program year is 2014. If you are unsure of your general education or program year, please see your adviser. You can also get this information from your degree audit, which can be obtained online at <https://elion.psu.edu/>.

Forest Science Undergraduate Program

Introduction

Degrees in forestry have been awarded at Penn State since 1907 and our program was among the first group of forestry programs accredited by the Society of American Foresters (SAF) in 1935. The SAF is a professional organization that strives, among other things, to advance the science, education, technology, and practice of forestry and is the only organization that may accredit forestry curricula in the United States. Penn State's Forest Management, Forest Biology, and Urban Forestry options are accredited by SAF and all fulfill the educational qualification requirements for the federal occupational series in forestry. The Watershed Management is not accredited by the Society of American Foresters but the option fulfills the educational qualification requirements for the federal occupational series in hydrology. In addition, it is possible through elective coursework to satisfy several federal Wildland Firefighter basic trainings (Basic Firefighting PA130 and Introduction to Fire Behavior S190) and Wildfire Power Saws S212.

Professional foresters are challenged with restoration, habitat creation and maintenance, and the sustainable provision of a wide range of ecosystem services, which may include clean water, construction timber, carbon sequestration, pulpwood, wildlife habitat, nontimber forest products, recreational opportunities, and trees to beautify rural and urban landscapes. For a successful forestry career, several personal qualities are desirable:

- a love of the woods and the outdoors
- an ethical concern for natural resources and an appreciation of nature
- an interest in the complexity of forest ecosystems and a desire to work where people and nature meet (at the interface of biology, ecology, economics, and social issues)
- an analytical mind and creative abilities for problem solving
- the ability to communicate with the public and to supervise employees.

Graduates may become forest managers who are responsible for managing the flora and fauna in thousands of acres of forests and watersheds, including valuable timberland, national and state parks, game lands, and

recreation areas. Others may work as ecologists, studying environmental factors that affect forests, or as consultants, surveying timberlands and recommending harvest and reforestation practices. Graduates also find employment as community foresters managing street trees and urban green spaces; as biometricians working with databases to assess forest conditions and trends; as industrial foresters ensuring a company's need for raw materials; as park superintendents overseeing the operation of parks and recreation facilities; as resource economists determining levels of supply and demand for forest resources; as hydrologists measuring stream flow and managing municipal watersheds; or in forest policy, addressing issues raised by the interaction of people and forests.

Employment opportunities for graduates of the Forest Management and Forest Biology options include forest management positions with public agencies such as the Bureau of Forestry and the U.S. Forest Service, nonprofit organizations such as The Nature Conservancy, industries such as sawmills and bioenergy facilities, and private environmental consulting firms. The Urban Forestry option prepares students to manage community trees and green spaces. Employment opportunities include municipalities, arboricultural companies, utilities, and government agencies. The Watershed Management option focuses on the integrated management of natural resources, with emphasis on water. Graduates can find federal employment as hydrologists or pursue careers in municipal watershed management; in local, state, and federal government; and in environmental/engineering consulting.

Mission

The mission of the bachelor of science program in Forest Science is to help students develop the knowledge, skills, and professional ethics for understanding and managing forest ecosystems and living as responsible members of society.

Curriculum Overview

The B.S. program in Forest Science provides the education necessary for students to pursue professional careers in one of the following four options: (1) Forest Biology, (2) Forest Management, (3) Urban Forestry, and (4) Watershed Management. These options also prepare students for graduate studies and continuing professional education.

As with many professions, the scope and complexity of the forestry profession has increased since its inception in the United States nearly a century ago. Not only do foresters now manage for a wide range of ecosystem services requiring specialized knowledge, but technological advances have expanded the range of necessary technical skills while societal shifts have expanded the range of necessary professional skills. The Forest Science curriculum satisfies these three areas by 1) ensuring professional skills through general education requirements and across-the-board skill development in upper-division courses, 2) providing technical skills through the core requirements of the major, and 3) offering four separate options for specialization.

Forest Biology Option: This option provides a strong background in the biological and ecological aspects of contemporary forestry and establishes a sound foundation for professional employment and graduate-level study in forest and environmental sciences.

Forest Management Option: This option provides professional training in the management of forest lands consistent with the needs of ownership objectives. Employment opportunities include forest management positions with public agencies, industry, and private consulting firms.

Urban Forestry Option: This option prepares students for managerial responsibilities related to landscape trees and green space in communities and emphasizes planning and technical expertise in community forestry and arboriculture. A broad basic education is the foundation for specialized courses covering urban forest management, arboriculture, planning and public policy, landscape design, soils, tree disease and insect problems, business and legal matters, communicative abilities, and supervisory skills, including working with diverse people and natural resource issues. Excellent employment opportunities include municipalities, arboricultural companies, utilities, government agencies, and non-profit organizations.

Watershed Management Option: This option focuses on water resources and the integrated management of natural resources with emphasis on water. Graduates qualify for federal employment as hydrologists and for water-related careers in municipal watershed management, state and local government, and environmental/engineering consulting.

Forest Science Curriculum Requirements

(Last revised summer 2008)

120 - 127 credits are required for a Bachelor of Science degree in Forest Science:

- Forest Biology Option - 127 credits
- Forest Management Option - 127 credits
- Urban Forestry Option - 127 credits
- Watershed Management Option - 120 credits

Courses Required for ALL Options:

(Individual course credits are given in parentheses.)

COMMUNICATIONS

- ENGL 015 GWS - Rhetoric and Composition (3)
- ENGL 202C GWS - Technical Writing (3)
- ENGL 215, 416, 418, 419, or AEE 440 - Advanced communications selection (3)
- CAS 100 GWS - Effective Speech (3)
- CAS 211, 213, 250, or 352 - Advanced speech selection (3)

QUANTIFICATION

- MATH 110 or 140 GQ - Calculus selection (4)
- STAT 240 GQ - Introduction to Biometry (3) ▲

NATURAL SCIENCES and OTHER PRESCRIBED COURSES

- BIOL 110 GN - Basic Concepts and Biodiversity (4)
- CHEM 110 GN - Chemical Principles (3)
- CHEM 111 GN - Experimental Chemistry (1)
- ECON 102 GS – Microeconomics (3)
- FOR 200W - Professional Careers in Forest Resources (3)
- FOR 203* - Field Dendrology (3)
- W P 203*- Anatomical Properties of Wood (1)
- FOR 308* - Forest Ecology (3)
- SOILS 101 - Introduction to Soils (3) ▲

*Courses requiring at least a C grade.

▲ = See notes about STAT 240 and SOILS 101 on page 10.

ARTS [GA]

- Select from the University-approved Arts list (6)

HUMANITIES [GH]

- Select from the University-approved Humanities list (6)

SOCIAL AND BEHAVIORAL SCIENCES [GS]

- ECON 102 GS - Introductory Microeconomic Analysis and Policy (3)
- Select from the University-approved Social and Behavioral Sciences list (3)

HEALTH SCIENCES and PHYSICAL EDUCATION [GHA, GPE, or GHS]

- Select from the University-approved Health Sciences and Physical Education course list (3)

ELECTIVES

- Open selection (excludes remedial courses) (1-4)

UNITED STATES CULTURES and INTERNATIONAL CULTURES

- Select 3 credits of University-approved United States Cultures (US) and 3 credits of University-approved International Cultures (IL) (6)
- Courses that are listed as both US or IL and GA, GH, or GS can count for both requirements (i.e., a course listed for both GA and IL will satisfy both Arts and International Cultures).

FIRST-YEAR SEMINAR

- Select a course designated as a First-Year Seminar (1+)

WRITING-INTENSIVE COURSE WORK [W]

- Select a writing-intensive course within your major or college of enrollment. (3)
This is satisfied by completion of FOR 200W or FOR 466W.

Note: Acceptable selections for Arts, Humanities, Social and Behavioral Sciences, United States Cultures, International Cultures, Health Sciences and Physical Education, and First-Year Seminar are listed in the *General Education in the Curriculum* handbook, or on the Web at <http://bulletins.psu.edu/bulletins/bluebook/>.

Required Field Equipment

One of the hallmarks of the professional forester is familiarity and competency with commonly used field equipment. Several of the required core courses of the Forest Science major require you to provide your own field equipment. Most of this equipment will be required by more than one course and, if properly maintained, will serve you for many years. It is your responsibility to obtain the required equipment in advance of each course. The School does not require you to purchase equipment from any particular dealer (and you may purchase used equipment).

Equipment	Courses
	(required core courses in bold)
Mirrored compass*	FOR 366, 308 , 439
Clinometer* (with topo 1:66 and percent scales)	FOR 366, 308 , 421, 439
75' Loggers tape (with DBH in tenths on backside)	FOR 366, 308 , 421, 439
10 BAF prism	FOR 366 , 421, 439
Hard hat	FOR 366 , 320, 439
Hard hat ear muffs & visor**	FOR 228
Cruising vest	optional
Tree stick (Biltmore scale, Merritt Hypsometer, log rule, volume table (form class 78)	optional

*Protective cases, although optional, are highly recommended to prolong the life of your equipment.

**If you plan to take FOR 228, Chainsaw Safety, (which counts only for Elective credit), purchase ear muffs and visor at the same time as your hard hat to make sure they are compatible. The instructor recommends a Peltor Complete Lumberjack System, available locally from Milheim Small Engine or through mail order or online.

Ben Meadows offers the following discounts to Penn State students.

To get the discount, you must refer to **Quote Number QC816994** when placing your order.

Item #	Description	Price	Student Cost
102204	SUUNTO® Self-Damping Clinometers	\$135.00	\$121.50
122206	Spencer® Combination Logger's / Diameter Tape	\$66.00	\$59.40
102221	Cruising Prisms	\$21.10	\$18.99
121612	Tree and Log Scale Sticks – Doyle	\$12.60	\$11.34
121614	Tree and Log Scale Sticks – International	\$12.60	\$11.34
121616	Tree and Log Scale Sticks – Scribner	\$12.60	\$11.34
102016	BRUNTON® Nexus Elite Compass	\$49.60	\$44.64

Forest Biology Option

Additional courses for the Forest Biology option:

- BIOL 240W - Function and Development of Organisms (4)
- CHEM 202 - Organic Chemistry (3)
- ENT 313 - Introduction to Applied Entomology (2)
- FOR 204 - Dendrology (2)
- FOR 320 - Forest Fire Management (2)
- FOR 350 - Forest Resources Biometrics (3)
- FOR 366* - Forest Resources Measurements (4)
- FOR 409 - Tree Physiology (3)
- FOR 410 - Elements of Forest Ecosystem Management (3)
- FOR 421* - Silviculture (3)
- FOR 430 - Conservation Biology (3)
- FOR 475* - Principles of Forest Soil Management (3) ▲
- FOR 480 - Policy and Administration (3)
- FOR 494 - Forestry Research (3)
- P PATH 318 - Forest Pest Management (2)
- W F S 209 - Wildlife and Fisheries Conservation (3)
- AG BM 200 or MGMT 100 - Business/management selection (3)
- FOR 455 or GEOG 362 - Remote sensing/image and data analysis selection (3)
- Supporting Courses (list below) selected in consultation with a Forest Science adviser (9)

*Courses requiring at least a C grade.

▲ = See note about FOR 475 on page 10

The course topics listed below are suggested **Supporting Course selections** for the Forest Biology option. This list is illustrative and not restrictive. Other courses may be selected to better reflect a student's professional interests. *A course from a topic area not on the list must be approved as a Supporting Course by a Forest Science adviser before it is scheduled.*

Forestry	Wood Products
Wildlife and Fisheries Science	Biology
Plant Science	Ecology
Soil Science	Geography

**All students are strongly encouraged to participate in undergraduate research experience as work study, internship, or independent study. FOR 495 or 496 credits can be used as Supporting Courses; prior approval required.

Please see the internship handbook at: <http://ecosystems.psu.edu/students/career-development/internships/internship-handbook>

Recommended Academic Plan for Forest Science - Forest Biology, Commonwealth Campuses and University Park, Effective Summer 2008

Semester 1 (fall)	Credits	Semester 2 (spring)	Credits
BIOL 110 (GN)	4	ENGL 015 or 030 (GWS)	3
MATH 110 or 140 (GQ)	4	CHEM 111 GN	1
CHEM 110 (GN)	3	BIOL 240W (GN)	4
Humanities (GH)	3	ECON 102 (GS)	3
First-Year Seminar	1-3	Social and Behavioral Sciences (GS)	3
		Humanities (GH)	3
Total Credits:	15-17	Total Credits:	17
Semester 3	Credits	Semester 4	Credits
FOR 200W	3	FOR 204	2
FOR 203	3	FOR 366	4
W P 203	1	FOR 350	3
SOILS 101	3	CAS 100 (GWS) <i>Effective Speech</i>	3
STAT 240 (GQ)	3	CHEM 202	3
Arts (GA)	3		
Total Credits:	16	Total Credits:	15
Semester 5	Credits	Semester 6	Credits
FOR 308	3	ENT 313	2
ENGL 202C (GWS)	3	PPATH 318	2
W F S 209	3	FOR 320	2
FOR 480	3	FOR 409 (odd springs) or Elective	2-3
Arts (GA)	3	MGMT 100 or AG BM 200	3
Health and Physical Activity (GHA)	1.5	CAS 211, 213, 250, or 352	3
		Health and Physical Activity (GHA)	1.5
Total Credits:	16.5	Total Credits:	15.5-16.5
Semester 7	Credits	Semester 8	Credits
FOR 421	3	FOR 475	3
FOR 455 or GEOG 362	3	FOR 494	3
FOR 430	3	FOR 410	3
AEE 440, ENGL 215, 416, 418, or 419	3	Supporting Course selections	6
Supporting Course Selection	3	FOR 409 (odd springs) or Elective	2-3
Total Credits:	15	Total Credits:	17-18

- **Bold** type indicates courses requiring a quality grade of C or better.
- *Italics* indicates courses that satisfy both major and General Education requirements.
- ***Bold Italics*** indicates courses requiring a quality grade of C or better and that satisfy both major and General Education requirements.
- GWS, GHA, GQ, GN, GA, GH, and GS are codes used to identify General Education requirements.
- US, IL, and US;IL are codes used to designate courses that satisfy University United States/International Cultures requirements.
- W is the code used to designate courses that satisfy University Writing Across the Curriculum requirements.

Scheduling patterns for courses not taught each semester: FOR 409 is only taught spring of odd years, please plan to take it spring of your junior or senior year; many FOR classes are only taught once per year, in the fall OR the spring, please plan your schedule accordingly.

Program Notes:

All Supporting Course selections are listed on the department's website (<http://ecosystems.psu.edu/>) in the Forest Science Handbook (under *Student Resources*). Please also note that FOR 200W, FOR 203, and W P 203 are offered only in the fall semester and *must be taken concurrently*, preferably in the 3rd semester. Because of the requirements of these courses, it is recommended that students do not take any other courses on Tuesdays and Thursdays that same semester.

▲ FOR 475 – FOR 475 may be offered again in Fall 2013. In the interim, please contact the Undergraduate Programs office (814) 865-4237 for a list of acceptable alternative courses to fulfill this requirement.

▲ STAT 240 – STAT 200 and STAT 250 are acceptable alternatives to STAT 240.

▲ SOILS 101 – Effective Spring 2011, SOILS 101 at University Park is a lecture-only course. FORSC majors are strongly encouraged to take SOILS 102, but SOILS 102 is not yet an official requirement for the Forest Science degree. SOILS 102 counts as a Supporting Course in the Forest Management and Forest Biology options.

Academic Advising Notes:

US and IL cultures may count twice with GA, GH, or GS course.

Student				Checksheet Forest Science, Forest Biology Option Effective Summer 2008, 127 Credits Required The Pennsylvania State University College of Agricultural Sciences Department of Ecosystem Science and Management				Adviser			
Student Number								Gen. Ed. Year		Program Year	
E-mail Address								Date			
Requirements for the Major								General Education (Effective Summer 2005)			
Sem.	Course	Credits	Grade	Sem.	Course	Credits	Grade	Sem.	Course	Credits	Grade
Prescribed Courses for the Major (27 cr.)				Prescribed Courses for the Option (45 cr.)				Communication (9 cr. GWS)			
	BIOL 110	4			BIOL 240W	4			ENGL 015	3	
	CHEM 110	3			CHEM 202	3			CAS 100A, B or C	3	
	CHEM 111	1			ENT 313	2		and ENGL 202C GWS			
	ECON 102	3			FOR 204	2		Quantification (6 cr.) MATH GQ and STAT GQ			
	FOR 200W	3			FOR 320	2		Natural Sciences (9 cr.) BIOL GN and CHEM GN			
	FOR 203*	3			FOR 350	3		Arts (6 cr. GA)			
	FOR 308*	3			FOR 366*	4				3	
	SOILS 101	3			FOR 409	2				3	
	STAT 240	3			FOR 410	3		Humanities (6 cr. GH)			
	W P 203*	1			FOR 421*	3				3	
Additional Courses for the Major (13 cr.)					FOR 430	3		Social and Behavioral Sciences (6 cr. GS)			
	MATH 110 or 140	4			FOR 475*	3				3	
	AEE 440, ENGL 215, ENGL 416, ENGL 418, or ENGL 419	3			FOR 480	3		and ECON 102 GS			
	CAS 211, CAS 213, CAS 250, CAS 252 or CAS 352	3			FOR 494	3		United States Cultures (3 cr. US)**			
	ENGL 202C or ENGL 202D	3			PPATH 318	2				3	
Electives (3 cr.)					W F S 209	3		International Cultures (3 cr. IL)**			
				Additional Courses for the Option (6 cr.)						3	
					AG BM 200 or MGMT 100	3		**May count twice with GA, GH, GS, or Elective			
					FOR 455 or GEOG 362	3		First-Year Seminar (1-3 cr.)			
A minimum cumulative GPA of 2.00 is required for graduation.				Supporting Courses for the Option (9 cr.) Select 9 credits in consultation with adviser.				Health and Physical Education (3 cr. GHA)			
*Courses requiring at least a C grade.											
7/12				11							

Forest Management Option

Additional courses for the Forest Management option:

- ENT 313 - Introduction to Applied Entomology (2)
- FOR 204 - Dendrology (2)
- FOR 320 - Forest Fire Management (2)
- FOR 350 - Forest Resources Biometrics (3)
- FOR 366* - Forest Resources Measurements (4)
- FOR 421* - Silviculture (3)
- FOR 440 - Forest Economics and Finance (3)
- FOR 455 - Remote Sensing and Spatial Data Handling (3)
- FOR 466W* - Forest Resource Management (3)
- FOR 470 - Watershed Management (3)
- FOR 475 - Principles of Forest Soil Management (3) ▲
- P PATH 318 - Forest Pest Management (2)
- FOR 480 - Policy and Administration (3)
- W F S 209 - Wildlife and Fisheries Conservation (3)
- AG BM 200 or MGMT 100 - Business/management selection (3)
- FOR 401, Urban Forest Management (3) or FOR 416, Forest Recreation (3) ▲
- GEOG 110, 115, 160 GEOSC 002, 010 METEO 003, or 250 - Selection in climatology, landforms, geology, meteorology, or physics.
- Supporting Courses (listed below) selected in consultation with a Forest Science adviser (12)

**Courses requiring at least a C grade.

▲ See notes about FOR 416 and FOR 475 on page 14.

Courses for the **Supporting Course** requirement of the Forest Management option must be selected from the list below.

FOR 401 - *Urban Forest Management* (3)
FOR 409 - *Tree Physiology* (2)
FOR 410 - *Elem. of For Ecosys Mgmt* (3)
FOR 418 – *Agroforestry* (3)
FOR 430 - *Conservation Biology* (3)
FOR 451 - *Artif Intellig & Expert Syst* (3)
FOR 471 - *Watershed Mgmt Lab* (1)
FOR 488W - *International Forestry* (3)
FOR 496 - *Independent Studies* (3)
FOR 497 - *Special Topics* (2-6)
A S M 327 - *Soil & Water Res Mgmt* (3)
ENT 319 - *Forest Pest Management* (1)
MATH 111 - *Tech of Calculus II* (2)
CMPSC 101 - *Intro to C++ Programming* (3)
CMPSC 100 – *Comp. Fundamentals and Appl.* (3)
CMPSC 203 – *Intro. to Sprdsh. and Databases* (4)
STAT 460 - *Interm Applied Statistics* (3)
STAT 462 - *Applied Regression Anal* (3)
STAT 464 - *Applied Nonparam Stat* (3)

ECON 004 or 302 - *Intro Macroecon Analysis & Policy or Intermediate Microecon Analysis* (3)
ECON 428, AG EC 201, 429, or 431W - *Environmental Economics, Renewable Resource Econ, Natural Resource Econ, Econ Analysis Env & Resource Policies*(3)
B LAW 243 or E R M 411 - *Legal Environment of Business or Legal Aspects of Resource Management* (3)
PL SC 001, 125, 417, or 419 - *Intro to American National Government, PA Gov & Politics, American Local Gov & Admin, or Bureaucracy & Public Policy* (3)
W P 411 - *Wood Products and Proc* (3)
W P 417 - *WP Manufacturing Systems and Processes*(4)
W P 435 – *WP Production and Sales Mgmt.* (3)
W P 437W - *Wood Ind Mrkting Mgmt* (4)
FOR 495 - *Internship*

Please see the internship handbook at:

<http://ecosystems.psu.edu/students/career-development/internships/internship-handbook>

Recommended Academic Plan for Forest Science-Forest Management, Commonwealth Campuses and University Park, Effective Summer 2008

Semester 1 (fall)	Credits	Semester 2 (spring)	Credits
BIOL 110 (GN)	4	ENGL 015 or 030 (GWS)	3
MATH 110 or 140 (GQ)	4	CHEM 111 GN	1
CHEM 110 (GN)	3	ECON 102 (GS)	3
Humanities (GH)	3	Arts (GA)	3
First-Year Seminar	1-3	Social and Behavioral Sciences (GS)	3
		Humanities (GH)	3
Total Credits:	15-17	Total Credits:	16
Semester 3	Credits	Semester 4	Credits
FOR 200W	3	FOR 204	2
FOR 203	3	FOR 366	4
W P 203	1	FOR 350	3
SOILS 101	3	CAS 100 (GWS) <i>Effective Speech</i>	3
STAT 240 (GQ)	3	GEOG 110, 115, GEOSC 002, METEO 003, PHYS 150, or PHYS 250	3
Arts (GA)	3	Health and Physical Activity (GHA)	1.5
Total Credits:	16	Total Credits:	16.5-17.5
Semester 5	Credits	Semester 6	Credits
FOR 308	3	ENT 313	2
ENGL 202C (GWS)	3	PPATH 318	2
W F S 209 (GN)	3	FOR 320	2
Supporting Course selections (see major handbook)	6	FOR 440	3
Health and Physical Activity (GHA)	1.5	MGMT 100 or AG BM 200	3
		CAS 211, 213, 250, or 352	3
Total Credits:	16.5	Total Credits:	15
Semester 7	Credits	Semester 8	Credits
FOR 421	3	FOR 475	3
FOR 455	3	FOR 470	3
FOR 480	3	FOR 466W	3
FOR 401 or 416	3	Supporting Course selections	3
AEE 440, ENGL 215, 416, 418, or 419	3	Elective	2-3
Supporting Course Selection	3		
Total Credits:	18	Total Credits:	14-15

- **Bold** type indicates courses requiring a quality grade of C or better.
- *Italics* indicates courses that satisfy both major and General Education requirements.
- ***Bold Italics*** indicates courses requiring a quality grade of C or better and that satisfy both major and General Education requirements.
- GWS, GHA, GQ, GN, GA, GH, and GS are codes used to identify General Education requirements.
- US, IL, and US; IL are codes used to designate courses that satisfy University United States/International Cultures requirements.
- W is the code used to designate courses that satisfy University Writing Across the Curriculum requirements.

Scheduling patterns for courses not taught each semester:

Many FOR classes are only taught once per year, in the fall OR the spring, please plan your schedule accordingly.

Program Notes:

All supporting course selections are listed on our website (<http://ecosystems.psu.edu/>) in the Forest Science Handbook (under *Student Resources*). Please also note that FOR 200W, FOR 203, and W P 203 are offered only in the fall semester and *must be taken concurrently*, preferably in the 3rd semester. Because of the requirements of these courses, it is recommended that students do not take any other courses on Tuesdays and Thursdays that same semester.

▲ FOR 416 – FOR 416 is no longer be offered. Please contact the Undergraduate Programs office (814) 865-4237 for a list of acceptable alternative courses to fulfill this requirement.

▲ FOR 475 – FOR 475 may be offered again in the Fall 2013. In the interim, please contact the Undergraduate Programs office (814) 865-4237 for a list of acceptable alternative courses to fulfill this requirement.

▲ STAT 240 – STAT 200 and STAT 250 are acceptable alternatives to STAT 240.

▲ SOILS 101 – Effective Spring 2011, SOILS 101 at University Park is a lecture-only course. FORSC majors are strongly encouraged to take SOILS 102, but SOILS 102 is not yet an official requirement for the Forest Science degree. SOILS 102 counts as a Supporting Course in the Forest Management and Forest Biology options.

Academic Advising Notes:

US and IL cultures may count twice with GA, GH, or GS course.

Urban Forestry Option

(Currently under revision)

Additional courses for the Urban Forestry option:

- BIOL 240W - Function and Development of Organisms (4)
- ENT 313 - Introduction to Applied Entomology (2)
- FOR 204 - Dendrology (2)
- FOR 350 - Forest Resources Biometrics (3)
- FOR 366* - Forest Resources Measurements (4)
- FOR 401* - Urban Forest Management (3)
- FOR 421- Silviculture (3)
- FOR 480 -Policy and Administration (3)
- HORT 138 - Ornamental Plant Materials (3)
- HORT 408 - Landscape Maintenance and Management (4)
- P PATH 318 - Forest Pest Management (2)
- FOR 495 or 496* - Forestry Internship or Independent Study (3)
- 3-6 credits from ENT 319, FOR 410, 416, 466W, 470, or W F S 209 - Forestry or Wildlife and Fisheries selection
- 2-3 credits from FOR 409, FOR 430, or E R M 430 - Pollutant impacts, tree physiology, or conservation biology selection
- 3 credits from A S M 217 or FOR 475[▲] – Soil and water management or soils selection
- 3-6 credits from GEOG 102, LARCH 003, 060, and 127 - Landscape history or design selection
- 3-6 credits from MGMT 100, 341, R SOC 305, or 460 - Human resource or information management selection
- 3-6 credits from B A 250, B LAW 243, or E R M 411 - Business or law selection

**Courses requiring at least a C grade.*

[▲] FOR 416 – FOR 416 is no longer be offered. Please contact the Undergraduate Programs Office (814) 865-4237 for a list of acceptable alternative courses to fulfill this requirement.

[▲] FOR 475 – FOR 475 may be offered again in Fall 2013. In the interim, please contact the Undergraduate Programs Office (814) 865-4237 for a list of acceptable alternative courses to fulfill the requirement.

**All students are strongly encouraged to participate in undergraduate research experience as work study, internship, or independent study. FOR 495 or 496 credits can be used as Supporting Courses; prior approval required. Please see the internship handbook at:

<http://ecosystems.psu.edu/students/handbooks/internship-handbook/view>

Please contact the Undergraduate Programs Office for information on pending changes

Recommended Academic Plan for Forest Science- Urban Forestry, Commonwealth Campuses and University Park Effective Summer 2008, (CURRENTLY UNDER REVISION, see adviser)

Semester 1 (fall)	Credits	Semester 2 (spring)	Credits
BIOL 110 (GN)	4	ENGL 015 or 030 (GWS)	3
MATH 110 or 140 (GQ)	4	CHEM 111 GN	1
CHEM 110 (GN)	3	BIOL 240W (GN)	4
Humanities (GH)	3	ECON 002/102 (GS)	3
First-Year Seminar	1-3	Social and Behavioral Sciences (GS)	3
		Humanities (GH)	3
Total Credits:	15-17	Total Credits:	17
Semester 3	Credits	Semester 4	Credits
FOR 200W	3	FOR 204	2
FOR 203	3	FOR 366	4
W P 203	1	FOR 350	3
ENT 313	3	CAS 100 (GWS) <i>Effective Speech</i>	3
STAT 240 (GQ)	3	PPATH 318	2
Arts (GA)	3	Health and Physical Activity (GHA)	1.5
Health and Physical Activity (GHA)	1.5		
Total Credits:	17.5	Total Credits:	15.5
Semester 5	Credits	Semester 6	Credits
FOR 308	3	FOR 495 or FOR 496 (internship, may be taken in the summer)	3
ENGL 202C (GWS)	3	CAS 211 , 213 , 250 , or 352	3
SOILS 101	3	Supporting Course selection	6
HORT 138	3		
Supporting Course selections (see major handbook)	6		
Total Credits:	18	Total Credits:	12
Semester 7	Credits	Semester 8	Credits
FOR 401	3	Supporting Course selections	9
FOR 421	3	Elective	1-3
FOR 480	3	HORT 408	4
AEE 440 , ENGL 215 , 416 , 418 , or 419	3		
Supporting Course Selection	3		
Arts (GA)	3		
Total Credits:	18	Total Credits:	14-16

- **Bold** type indicates courses requiring a quality grade of C or better.
- *Italics* indicates courses that satisfy both major and General Education requirements.

- ***Bold Italics*** indicates courses requiring a quality grade of C or better and that satisfy both major and General Education requirements.
- GWS, GHA, GQ, GN, GA, GH, and GS are codes used to identify General Education requirements.
- US, IL, and US;IL are codes used to designate courses that satisfy University United States/International Cultures requirements.
- W is the code used to designate courses that satisfy University Writing Across the Curriculum requirements.

Scheduling patterns for courses not taught each semester:

Many FOR classes are only taught once per year, in the fall OR the spring, please plan your schedule accordingly.

Program Notes: All supporting course selections are listed on our website (<http://ecosystems.psu.edu/>) in the Forest Science Handbook (under *Student Resources*). Please also note that FOR 200W, FOR 203, and W P 203 are offered only in the fall semester and *must be taken concurrently*, preferably in the 3rd semester. Because of the requirements of these courses, it is recommended that students do not take any other courses on Tuesdays and Thursdays that same semester.

▲ FOR 416– FOR 416 is no longer be offered. Please contact the Undergraduate Programs office (814) 865-4237 for a list of acceptable alternative courses to fulfill this requirement.

▲ FOR 475 – FOR 475 may be offered in Fall 2013. In the interim, please contact the Undergraduate Programs Office (814) 865-4237 for a list of acceptable alternative courses to fulfill the requirement.

▲ STAT 240 – STAT 200 and STAT 250 are acceptable alternatives to STAT 240.

▲ SOILS 101 – Effective Spring 2011, SOILS 101 at University Park is a lecture-only course. FORSC majors are strongly encouraged to take SOILS 102, but SOILS 102 is not yet an official requirement for the Forest Science degree. SOILS 102 counts as a Supporting Course in the Forest Management and Forest Biology options.

Academic Advising Notes:

US and IL cultures may count twice with GA, GH, or GS course.

Student				Checksheet Forest Science, Urban Forestry Option Effective Summer 2008, 127 Credits Required The Pennsylvania State University College of Agricultural Sciences Department of Ecosystem Science and Management				Adviser			
Student Number								Gen. Ed. Year		Program Year	
E-mail Address								Date			
Requirements for the Major				General Education (Effective Summer 2005)							
Sem.	Course	Credits	Grade	Sem.	Course	Credits	Grade	Sem.	Course	Credits	Grade
Prescribed Courses for the Major (30 cr.)				Prescribed Courses for the Option (33 cr.)				Communication (9 cr. GWS)			
	BIOL 110	4			BIOL 240W	4			ENGL 015	3	
	CHEM 110	3			ENT 313	2			CAS 100A, B or C	3	
	CHEM 111	1			FOR 204	2		and ENGL 202C			
	ECON 102	3			FOR 350	3		Quantification (6 cr.) MATH GQ and STAT GQ			
	ENGL 202C	3			FOR 366*	4		Natural Sciences (9 cr.) BIOL GN and CHEM GN			
	FOR 200W	3			FOR 401*	3		Arts (6 cr. GA)			
	FOR 203*	3			FOR 421	3				3	
	FOR 308*	3			FOR 480	3				3	
	SOILS 101	3			HORT 138	3		Humanities (6 cr. GH)			
	STAT 240	3			HORT 408	4				3	
	W P 203*	1			P PATH 318	2				3	
Additional Courses for the Major (10 cr.)				Additional Courses for the Option (3 cr.)				Social and Behavioral Sciences (3 cr. GS)			
	MATH 110 or 140	4			FOR 495* or 496*	3				3	
	AEE 440, ENGL 215, 416, 418, or 419	3		Supporting Courses for the Option (Need 24 cr.) In consultation with adviser, select: 3-6 cr. from ENT 319, FOR 410, 416, 466W, 470, or W F S 209				and ECON 102 GS			
	CAS 211, 213, 250, 252, or 352	3		2-3 cr. from E R M 430, FOR 409, FOR 430				United States Cultures (3 cr. US)**			
Electives (3 cr.)				3 cr. from A S M 217 or FOR 475				International Cultures (3 cr. IL)**			
				3-6 cr. from GEOG 122, LARCH 003, 060, or 241				**May count twice with GA, GH, GS course or elective			
				3-6 cr. from MGMT 100 or 341, and RSOC 305W				First-Year Seminar (1-3 cr.)			
A minimum cumulative GPA of 2.00 is required for graduation. *Courses requiring at least a C grade.				3-6 cr. from B A 250, B LAW 243, or E R M 441				Not required for transfer students			
								Health and Physical Education (3 cr. GHA)			
7/12				21							

Watershed Management Option

Additional courses for the Watershed Management option, **please discuss with an adviser:**

- A S M 327 - Soil and Water Resource Management (3)
- W F S/ERM 435* - Limnology(3)
- CHEM 202 - Organic Chemistry (3)
- FOR 410 - Elements of Forest Ecosystem Management (3)
- FOR 470 - Watershed Management (3)
- FOR 471 - Watershed Management Lab (1)
- GEOSC 001 - Physical Geology (3)
- GEOSC 452* - Hydrogeology (3)
- MATH 111 - Techniques of Calculus II (2)
- METEO 003 GN - Introductory Meteorology (3)
- MICRB 201 - Introductory Microbiology (3)
- PHYS 250 **and** 251 - Introductory Physics (8)
- SOILS 422 - Conservation of Soil and Water Resources (3)
- PL SC 001 - (GS) Introduction to American National Government (3)
- ECON 302 or 428 or E RRE (AG EC) 201, 429, 431W - Environmental/resource economics selection (3)
- E R M 411 or Business Law 243 PL SC 125, 417, or 419- Environmental or business law selection/Government/policy selection (3)
- FOR 455, or GEOG 362, or 364, or SOILS 450 - Remote sensing/image and data analysis selection (3)

**Courses requiring at least a C grade.*

**All students are strongly encouraged to participate in undergraduate research experience as work study, internship, or independent study. FOR 495 or 496 credits can be used as Supporting Courses; prior approval required. Please see the internship handbook at:

<http://ecosystems.psu.edu/students/handbooks/internship-handbook/view>

Recommended Academic Plan for Forest Science- Watershed Management, Commonwealth Campuses and University Park, Effective Summer 2008

Semester 1 (fall)	Credits	Semester 2 (spring)	Credits
<i>BIOL 110 (GN)</i>	4	<i>ENGL 015 or 030 (GWS)</i>	3
<i>MATH 110 or 140 (GQ)</i>	4	CHEM 202	3
<i>CHEM 110 (GN)</i>	3	<i>MATH 111 or 141 (GQ)</i>	2-4
<i>CHEM 111 (GN)</i>	1	METEO 003 (GN)	3
Humanities (GH)	3	<i>PL SC 001 (GS)</i>	3
First-Year Seminar	1-3		
Total Credits:	16-18	Total Credits:	14-16
Semester 3	Credits	Semester 4	Credits
FOR 200W	3	SOILS 101	3
FOR 203	3	Arts (GA)	3
W P 203	1	PHYS 251	4
<i>CAS 100 (GWS) Effective Speech</i>	3	BIOL 220W	4
<i>STAT 240 (GQ)</i>	3	GEOSC 001	3
PHYS 250	4		
Total Credits:	17	Total Credits:	17
Semester 5	Credits	Semester 6	Credits
FOR 308	3	SOILS 422	3
B LAW 243, E R M 411, PL SC 125, PL SC 417, PL SC 419	3	CAS 211, 213, 250, or 352	3
MICRB 201	3	Elective	3
Arts (GA)	3	Health and Physical Activity (GHA)	1.5
ECON 002/102 (GS) or ECON 004/104 (GS)	3	<i>ENGL 202C (GWS)</i>	3
Total Credits:	15	Total Credits:	13.5
Semester 7	Credits	Semester 8	Credits
A S M 327	3	FOR 470	3
W F S / E R M 435	3	FOR 471	1
GEOSC 452	3	FOR 410	3
FOR 455, GEOG 362, GEOG 364, or SOILS 450	3	AEE 440, ENGL 215, 416, 418, or 419	3
E RRE 201, E RRE 431W, E REE 429, ECON 302, or ECON 428	3	Humanities (GH)	3
Health and Physical Activity (GHA)	1.5		
Total Credits:	16.5	Total Credits:	13

- **Bold** type indicates courses requiring a quality grade of C or better.
- *Italics* indicate courses that satisfy both major and General Education requirements.
- ***Bold Italics*** indicates courses requiring a quality grade of C or better and that satisfy both major and General Education requirements.
- GWS, GHA, GQ, GN, GA, GH, and GS are codes used to identify General Education requirements.
- US, IL, and US;IL are codes used to designate courses that satisfy University United States/International Cultures requirements.
- W is the code used to designate courses that satisfy University Writing Across the Curriculum requirements.

Scheduling patterns for courses not taught each semester:

Many FOR classes are only taught once per year, in the fall OR the spring, please plan your schedule accordingly.

Program Notes: All supporting course selections are listed on the department's website (<http://ecosystems.psu.edu/>) in the Forest Science Handbook (under *Student Resources*).

▲ SOILS 101 – Effective Spring 2011, SOILS 101 at University Park is a lecture-only course. FORSC majors are strongly encouraged to take SOILS 102, but SOILS 102 is not yet an official requirement for the Forest Science degree. SOILS 102 counts as a Supporting Course in the Forest Management and Forest Biology options.

Academic Advising Notes:

US and IL cultures may count twice with GA, GH, or GS course.

Student				Checksheet Forest Science, Watershed Management Option Effective Summer 2008, 120 Credits Required The Pennsylvania State University College of Agricultural Sciences Department of Ecosystem Science and Management				Adviser			
Student Number								Gen. Ed. Year		Program Year	
E-mail Address								Date			
Requirements for the Major				General Education (Effective Summer 2005)							
Sem.	Course	Credits	Grade	Sem.	Course	Credits	Grade	Sem.	Course	Credits	Grade
Prescribed Courses for the Major (30 cr.)				Prescribed Courses for the Option (48 cr.)				Communication (9 cr. GWS)			
	BIOL 110	4			A S M 327	3			ENGL 015	3	
	CHEM110	3			W F S/E R M 435*	3			CAS 100A, B or C	3	
	CHEM 111	1			CHEM 202	3		and ENGL 202C GWS			
	ECON 102	3			BIOL 220W	4		Quantification (6 cr.) MATH GQ and STAT GQ			
	ENGL 202C	3			FOR 410	3		Natural Sciences (9 cr.) BIOL GN and CHEM GN			
	FOR 200W	3			FOR 470*	3		Arts (6 cr. GA)			
	FOR 203*	3			FOR 471	1				3	
	FOR 308*	3			GEO SC 001	3				3	
	SOILS 101	3			GEO SC 452*	3		Humanities (6 cr. GH)			
	STAT 240	3			MATH 111	2				3	
	W P 203*	1			METEO 003	3				3	
					MICR B 201	3		Social and Behavioral Sciences (GS) PL SC 001 and ECON 102 GS			
					PL SC 001	3		United States Cultures (3 cr. US) **			
					PHYS 250	4				3	
					PHYS 251	4		International Cultures (3 cr. IL)**			
					SOILS 422	3				3	
								**May count twice with GA, GH, GS course or elective			
Additional Courses for the Major (10 cr.)				Additional Courses for the Option (9 cr.)				First-Year Seminar (1-3 cr.)			
	MATH 110 or MATH 140	4			B LAW 243, E R M 411, PL SC 125, PL SC 417, or PL SC 419	3				1-3	
	AEE 440, ENGL 215, ENGL 416, ENGL 418, or ENGL 419	3			CED 201, CED 431W, CED 429, ECON 302, or ECON 428	3		Health and Physical Education (3 cr. GHA)			
	CAS 211, 213, 250, 252, or 352	3			FOR 455, GEOG 362, GEOG 364, or SOILS 450	3					
Electives (3 cr.)				A minimum cumulative GPA of 2.00 is required for graduation. *Courses requiring at least a C grade.							
7/12											

Minors Offered in the Ecosystem Science and Management Department

The Ecosystem Science and Management Department provides non-majors the opportunity to minor in Environmental Soil Science, Forest Science, Wildlife and Fisheries Science, or Wood Products Marketing. The requirements for each minor are listed below. **A grade of C or better is required for all courses in a minor.**

Environmental Soil Science Minor

(requirements last revised Spring 2004)

The Environmental Soil Science minor enables students to acquire scientific and field-related skills in preparation for environmental careers. Students learn to understand and apply soils and land use information in a wide variety of professional settings. The Environmental Soil Science minor will prepare students for jobs as professional soil scientists or for graduate studies in Soil Science and other interdisciplinary environmental sciences.

Students must complete a minimum of 18 credits from the list below to complete this minor.

Prescribed Courses (3 credits):

SOILS 101 (3)

Students must also select at least 15 credits from SOILS courses in consultation with an Environmental Soil Science adviser, including at least 6 credits at the 400 level.

Forest Science Minor

(requirements last revised Summer 2010)

The Forest Science minor is offered for students who wish to seek employment or achieve a basic competency in forestry without qualifying as professional foresters.

Students must complete 13 credits in Prescribed Courses and 5 - 6 credits selected from applied fields of study.

Prescribed Courses (13 credits):

- FOR 203 (3) – Field Dendrology
- FOR 308 (3) – Forest Ecology
- FOR 366 (4) – Forest Resources Measurements
- FOR 421 (3) – Silviculture

Students must also select at least 5 - 6 credits from the following list, of which 3 credits must be at the 400 level:

- FOR 320 (2) – Forest Fire Management
 - FOR 339 (3) – Timber Sale Administration
 - FOR 350 (3) – Forest Resources Biometrics
 - FOR 401 (3) – Urban Forest Management
 - FOR 409 (2) – Tree Physiology
 - FOR 410 (3) – Elements of Forest Ecosystem Management
 - FOR 416 (3) – Forest Recreation
 - FOR 418 (3) – Agroforestry: Science, Design, and Practice
 - FOR 430 (3) – Conservation Biology
 - FOR 440 (3) – Forest Economics and Finance
 - FOR 455 (3) – Remote Sensing and Spatial Data Handling
 - FOR 466W (3) – Forest Resource Management
 - FOR 470 (3) – Watershed Management
 - FOR 471 (1) – Watershed Management Laboratory
 - FOR 475 (3) – Principles of Forest Soils Management
 - FOR 480 (3) – Policy and Administration
 - FOR 488Y (3) – International Forestry
 - W P 203 (1) – Anatomical Properties of Wood
- Students may select other FOR courses by petition to the Forest Science faculty

Wildlife and Fisheries Science Minor

(requirements last revised Summer 2009)

The Wildlife and Fisheries Science minor provides non-majors with an introduction to the principles and practices of wildlife and fisheries conservation, research, and management.

Student must complete a minimum of 18 credits from the following list to complete the minor:

Prescribed Courses (6 credits):

W F S 209 (3) – Wildlife and Fisheries Conservation
W F S 430 (3) – Conservation Biology

Students must select a minimum of 12 credits from the following additional courses:

* Please note the two-credit classes; students must select a minimum of 12 credits

W F S 300 (2)* – The Vertebrates
W F S 407 (3) – Ornithology
W F S 408 (3) – Mammalogy
W F S 410 (3) – General Fishery Science
W F S 422 (3) – Ecology of Fishes
W F S/E R M 435 (3) – Limnology
W F S 440 (3) – Natural Resources Public Relations
W F S 447W (3) – Wildlife Management
W F S/ E R M 450 (3) – Wetland Conservation
W F S 452 (2)* – Ichthyology
W F S 460 (3) – Wildlife Behavior
W F S 462 (3) – Amphibians and Reptiles
W F S 463W (3) – Fishery Management

Students may select other W F S courses by petition to the W F S faculty

Wood Products Marketing Minor

(requirements last revised Fall 2001)

The Wood Products Marketing minor offers students in other majors, especially those oriented toward business, science, or engineering, an opportunity to develop a basic competency in wood products marketing and processing. Students will obtain knowledge and skills particularly helpful for those who wish to seek employment in sales, to specify wood-based materials for construction and design, or in other related fields in the wood products industries.

Students must complete 15 credits in Prescribed Courses and 3 or more credits in additional Wood Products courses, for a minimum total of 18 credits.

Prescribed Courses (15 Credits):

- W P 411 (4) – Wood-Environmental Relationships
- W P 417 (4) – Wood Products Manufacturing Systems & Processes
- W P 435 (3) – Wood Products Production and Sales Management
- W P 437W (4) – Wood Industries Marketing Management

Students must also select 3 credits from the following list:

- W P 200W (3) – Professional Careers in Forest Resources
- W P 203 (1) – Anatomical Properties of Wood
- W P 337 (2) – Wood Technology
- W P 400 (3) – Properties of Wood
- W P 411 (4) – Wood-Environmental Relationships
- W P 412 (3) – Wood in Structures
- W P 413 (3) – Chemistry of Wood
- W P 416 (3) – Wood Industries Management Development
- W P 418 (4) – Chemical Processing of Wood
- W P 423 (2) – Deterioration and Protection of Wood Products
- W P 438 (4) – Business Concepts for Wood Manufacturing
- W P 460 (3) – Wood Products Industrial Environmental Control
- W P 490 (1) – Wood Products Colloquium
- FOR 203 (3) – Field Dendrology

Study Abroad

School for Field Studies

Penn State's College of Agricultural Sciences has recently established a formal affiliation with The School for Field Studies for study abroad in Costa Rica and in Kenya.

For more information, please contact Ketja Lingenfelter, Education Abroad Adviser, Office of International Programs. College of Agricultural Sciences, 122 Agricultural Administration Building, Phone: 814-863-4164; e-mail ketja@psu.edu.

Office of International Programs

As an undergraduate student in the College of Agricultural Sciences, you can find accessible and affordable study abroad opportunities. Staff in the Office of International Programs can help you put together the right program and identify financial support. Learn more at <http://agsci.psu.edu/international>.

Office of Global Programs

The Penn State University Office of Global Programs also offers help in planning an international experience. Penn State has more than 180 summer, semester and full-year programs in over 45 countries! More than 60 of these programs are either specially designed, semester-length programs or are reciprocal exchange programs with an international university. The Office of Global Programs also offers numerous other short-term, faculty-led programs. With all these options, it is possible for students in nearly any discipline to study abroad. A listing of these programs may be found at <http://www.international.psu.edu/>. In addition, Penn State accepts transfer credits from many other programs.

Graduation Requirements

Knowing about and completing degree requirements is the student's responsibility. The *Baccalaureate Degree Programs Bulletin* and *Policies and Rules: A Handbook for Students* include information for which the student is responsible. This Wood Products Handbook is intended to supplement, and not replace, these sources of information.

To graduate, a candidate must complete the course requirements for the candidate's major and:

1. Earn at least a C (2.00) cumulative grade-point average for all courses taken at the University and
2. Earn at least a C grade in each major course designated by the major as a C-required course (starred on checksheet and designated in the online course bulletin).

Employment Resources

Career Services

Penn State's Career Services (<http://www.sa.psu.edu/career/>), located in the MBNA Career Center, offers employment assistance to students. Nearly 1,000 companies per year recruit students through this office. In addition, Career Services offers seminars and advising on job search strategies, resume and cover letter writing, interviewing, and hosts several career fairs throughout the year.

Ecosystem Science and Management Department

Your faculty and advisers can be your best contact for job information. Establishing early and frequent contact with them will assist you in your job search and help you to develop professional references.

The Ecosystem Science and Management Department maintains an employment webpage to assist you in your job search. This page includes job, internship, and graduate assistantship openings, as well as links to natural resources employers. It is important to remember that this is only one resource available to you and that an effective job search must utilize a variety of sources. The Ecosystem Science and Management department employment Web page is: <http://ecosystems.psu.edu/students/employment>.

Some of these resources are reserved for Ecosystem Science and Management students and alumni and require a password to access them. Passwords are periodically distributed through the student listservs. If you need a password or if you are not on the Forest Science student listserv, please email Dana Grove at dlg5035@psu.edu and ask to be added. If you are a current Ecosystem Science and Management student please include your student id number and major/option. Job postings are also available in the Edwards Student Center, 113 Forest Resources Building.

For detailed information, refer to the Ecosystem Science and Management Employment Handbook, available in 113 Forest Resources Building or on the Web at <http://ecosystems.psu.edu/students/employment/EmploymentHandbook.pdf>

Graduate Study

Graduate programs in forestry and natural resources management give students an understanding of the biology and management of forest resources, and can include training in: quantitative forest management, economics, biometrics, policy, remote sensing, forest recreation and sociology, watershed management practices, urban forestry, genetics, ecology, silviculture, restoration of disturbed lands, acid precipitation effects, water yield and quality, etc. Most programs of study are strengthened by including appropriate courses offered by related departments.

Regardless of the area of study, it is always recommended to gain real-world work experience, through an internship, summer job, or even a year or two off before graduate school.

Graduate degrees conferred by the Ecosystem Science and Management department are:

Forest Resources – M.S. and Ph.D. (includes forest science and wood products)
Wildlife and Fisheries Science – M.S. and Ph.D.

Graduate programs are designed to give students an understanding of the biology and management of wildlife or fish species and their environments, and include training in: ecology, nutrition, physiology, systematics, behavior, and pathology of a species or species groups; study of successional stages, land use, and management of various habitats and their impact on wildlife and fisheries populations; dynamics and manipulation of animal populations; and studies of recreational, aesthetic, and socioeconomic values of wildlife and fishes. Most programs of study are strengthened by including appropriate courses offered by related departments. A thesis is required for both the M.S. and Ph.D. degrees. The Ph.D. degree in Wildlife and Fisheries Science allows specialization in wildlife and fisheries ecology, management, and systematics at the doctoral level.

For admission, an applicant should have at least a 2.75 grade point average, at least a 3.00 junior-senior average, and courses that are basic to the individual's field of specialization. Ordinarily these include: 18 credits in forest science, wildlife and fisheries science, wood products; 12 credits in calculus, statistics, computer science; 12 credits in writing and speaking; 12 credits in economics, social sciences, humanities; 8 credits in chemistry and/or physics; and 8 credits in biology, botany, zoology. Graduate Record Examination (GRE) and Test of English as a Foreign Language (TOEFL) scores, three reference letters, and a brief statement describing the applicant's academic goals, career interests, and special qualifications are required. Exceptions to admission requirements may be made for students with special backgrounds, abilities, and interests.

Normally it takes about two years to complete the M.S. degree and three to five years to complete the Ph.D. Applicants with some deficiencies may be admitted but will need more time to satisfy degree requirements. If you are interested in an academic career, it is strongly recommended that you complete your doctorate at a different institution from the immediately previous degree.

Suggestions for Applying to Graduate School

1. Apply early – November/December. Sometimes early decisions will be made on a project before the majority of applicants have applied.

2. To focus your list of schools, use university catalogs (often found on the World Wide Web), specific position announcements, faculty contacts, and listings of faculty interests available from many departments.

3. Well-written letters of inquiry, including a resume, can be sent to specific faculty members or departments before you officially apply. Letters should have the following characteristics:

- a. typed neatly
- b. well-edited
- c. properly addressed
- d. informative – why you want to attend graduate school; several specific and general areas of research interest; advertise particular skills that may be of interest to a given faculty member or department.

4. Learn something about your particular research interests and the faculty who work in that area by reviewing the literature, particularly Science Citation Index.

5. Only apply officially if you are sincerely interested. Do not waste people's time or your money. Get applications and related transcripts, GRE scores, etc. in on time. Plan ahead. Ask permission to use people as references. Inform them early if they have to write a letter of recommendation.

6. Your application materials are generally your only form of representation, so take the time and do it right.

7. After sufficient time has passed, request the status of your application, but do not be annoying. If you do not have an offer by spring, keep in touch with Penn State faculty who may hear from colleagues about positions that become available in the summer.

8. Funding is desirable, but consider "proving" yourself for a semester in hopes of finding a project that becomes available later.

SAF – Accredited Professional Forestry Degree Programs

The Society of American Foresters (SAF) grants accreditation only to specific educational curricula that lead to a first professional degree in forestry, which can be either the bachelor's or master's level at any particular institution (e.g., at Penn State it is the B.S. level). The SAF maintains a list of accredited institutions on their website at: <http://www.eforester.org/education/accreditation.cfm>.

These institutions offer curricula that have been found to meet minimum standards for objectives, curriculum, faculty, students, administration, parent-institution support, and physical resources and facilities. The SAF accreditation process is recognized by the Commission on Recognition of Postsecondary Accreditation.

Course Descriptions

A S M 217 LANDSCAPE SOIL AND WATER MANAGEMENT (3) Landscape soil and water management and practices including irrigation, hydrology, erosion, open channel, drainage, and impoundments.

A S M 327 SOIL AND WATER RESOURCE MANAGEMENT (3) Soil and water management systems and practices including hydrology, surface drainage, open channels, and erosion, subsurface drainage, impoundments and irrigation. Prerequisite: PHYS 250

AEE 440 COMMUNICATIONS METHODS AND MEDIA (3) Mass media techniques for reporting and promoting extension and related programs including message preparation, presentation, and strategy development. Prerequisites: 3 credits in communication.

AG BM 200 INTRODUCTION TO AGRICULTURAL BUSINESS MANAGEMENT (3) Application of management principles and processes to agricultural business firms in their planning and operating in domestic and international markets.

BIOL 110 GN BIOLOGY: BASIC CONCEPTS AND BIODIVERSITY (4) A study of the evolution of the major groups or organisms including the fundamental concepts of biology.

BIOL 240W GN BIOLOGY: FUNCTION AND DEVELOPMENT OF ORGANISMS (4) A study of the development and physiological processes at the organismic level. Prerequisites: BIOL 110, CHEM 110.

CAS 100 GWS EFFECTIVE SPEECH (3) Introduction to speech communication, formal speaking, group discussion, analysis and evaluation of messages. W F S students may take CAS 100A, 100B or 100C.

CAS 211 INFORMATIVE SPEAKING (3) Planning, organizing, adapting, and presenting informative speeches and oral reports on technical/scholarly projects, both by manuscript reading and extemporaneously. Prerequisite: CAS 100.

CAS 213 PERSUASIVE SPEAKING (3) Planning, organizing, and adapting techniques of persuasion to achieve personal and public goals; engaging in critical assessment of persuasive messages. Prerequisite: CAS 100.

CAS 215 SMALL GROUP COMMUNICATION (3) Skill development in the areas of group discussion, leadership, and teamwork.

CAS 352 ORGANIZATIONAL COMMUNICATION (3) This course examines the function and structure of communication in both formal and informal situations.

CHEM 110 GN CHEMICAL PRINCIPLES (3) Basic concepts and quantitative relations. The following combinations of courses must be taken to receive General Education credit in chemistry: CHEM 110 GN (or CHEM 106 GN) and CHEM 111 GN; CHEM 112 GN and CHEM 113 GN. Prerequisite: satisfactory performance on the Chemistry and Math FTCAP tests-- i.e., placement beyond the level of CHEM 101 and MATH 022; or CHEM 101, and MATH 022 or MATH 041.

CHEM 111 GN EXPERIMENTAL CHEMISTRY (1) Introduction to quantitative experimentation in chemistry. The following combinations of courses must be taken to receive General Education credit in chemistry:

CHEM 110 GN (or CHEM 106 GN) and CHEM 111 GN; CHEM 112 GN and CHEM 113 GN. Prerequisite or concurrent: CHEM 110 or CHEM 106.

CHEM 202 FUNDAMENTALS OF ORGANIC CHEMISTRY (3) Introduction to organic chemistry, with emphasis on the properties of organic compounds of biochemical importance. Because of duplication of subject matter, students may not receive credit for both CHEM 202 and 210. Prerequisite: CHEM 101, 110, or 106.

E R M 411 LEGAL ASPECTS OF RESOURCE MANAGEMENT (3) Legal systems and lawmaking processes; property rights in land, water, and wildlife resources; jurisdictional problems in planning resource use. Prerequisite: E R M 151.

E R M/P PATH 430 AIR POLLUTION IMPACTS TO TERRESTRIAL ECOSYSTEMS(3) Overview of the direct and indirect effects of air pollutants on terrestrial plants and ecosystems. Prerequisite: BIOL 220W or FOR 308.

ECON 102 GS, INTRODUCTORY MICROECONOMIC ANALYSIS AND POLICY (3) Methods of economic analysis and their use; economic aggregates; price determination; theory of the firm; distribution.

ECON 104 GS. INTRODUCTORY MACROECONOMIC ANALYSIS AND POLICY (3) National income measurement; aggregate economic models; money and income; policy problems.

ECON 302 GS INTERMEDIATE MICROECONOMIC ANALYSIS (3) Allocation of resources and distribution of income within various market structures with emphasis on analytical tools. Prerequisite ECON 002.

ECON 428 ENVIRONMENTAL ECONOMICS (3) Environmental pollution, the market economy, and optimal resource allocation; alternative control procedures; levels of environmental protection and public policy. Prerequisite: ECON 302 or 323.

ENGL 015 GWS RHETORIC AND COMPOSITION (3). Instruction and practice in writing expository prose that shows sensitivity to audience and purpose. Prerequisite: ENGL 004 or satisfactory performance on the English proficiency examination.

ENGL 202C GWS. EFFECTIVE WRITING: TECHNICAL WRITING (3) Writing for students in scientific and technical disciplines. Prerequisite: ENGL 015 or ENGL 030; fourth-semester standing.

ENGL 215 INTRODUCTION TO ARTICLE WRITING (3) Written exercises in, and a study of, the principles of article writing; practice in the writing of scientific articles. Prerequisite: ENGL 015 or 030.

ENGL 416 SCIENCE WRITING (3 per semester, maximum of 6) Prepares scientists and writers to gather, interpret, and present scientific information to the layman with clarity and accuracy. Prerequisite: COMM 260W, ENGL 202C, 210, 215, or 421.

ENGL 418 ADVANCED TECHNICAL WRITING AND EDITING (3 per semester, maximum of 6) Preparing and editing professional papers for subject specialists and for other interested in careers as writers or editors. Prerequisite: ENGL 202A, 202B, 202C, 202D, or 215.

ENGL 419 ADVANCED BUSINESS WRITING (3) Preparing and editing reports and presentations common to business, industry, and government. Prerequisite: ENGL 202A, 202B, 202C, or 202D.

ENT 313 INTRODUCTION TO APPLIED ENTOMOLOGY (2) Introduction to basic entomology, covering insect diversity, identification, structure and function, and principles of management. Prerequisite: 3 credits of natural science.

FOR 200W PROFESSIONAL CAREERS IN FOREST RESOURCES (3) Introduction to managing forests for products and services to meet human needs; developing career goals and an academic plan. Concurrent: FOR 203

FOR 203 FIELD DENDROLOGY (3) Field identification of native and introduced trees and shrubs by leaf, fruit, twig, and bark.

FOR 204 DENDROLOGY (2) Taxonomic and silvical characteristics, ranges, genetic relationships, and uses of important forest tree species. Prerequisite: FOR 203

FOR 242 ELEMENTS OF PROJECT SUPERVISION IN FORESTRY (3) Supervisory techniques developed through an understanding of the behavioral sciences applied to field forestry personnel management. Offered only at the Mont Alto campus.

FOR 296 INDEPENDENT STUDIES (1-18)

FOR 297 SPECIAL TOPICS (1-9)

FOR 301 (HORT) PRINCIPLES OF ARBORICULTURE (3) Overview of the concepts and methods prescribed for the evaluation and care of large trees in urban settings. Prerequisite: BIOL 110 and SOILS 101.

FOR 308 FOREST ECOLOGY (3) Effect of environment, spacing, and age in trees; forest influences; origin and development of forest communities. Prerequisite or concurrent: FOR 203.

FOR 320 FOREST FIRE MANAGEMENT (2) Principles and concepts involved in managing the forest ecosystem in regard to fire. Prerequisite: FOR 308.

FOR 350 FOREST RESOURCES BIOMETRICS (3) Quantitative approaches for characterization and comparison of natural resources in forested landscapes. Prerequisite: One course each in calculus, statistics, and computers.

FOR 366 FOREST RESOURCES MEASUREMENTS (4) Measurement systems used in forest management, wildlife management, watershed management, urban forestry, and recreation management. Prerequisite: STAT 240.

FOR 401 URBAN FOREST MANAGEMENT (3) Uses and values of urban vegetation, open space, and wildlife; planning financing, support, management, and administration of urban forestry programs. Prerequisite: Three credits in business, management, or economics and six credits in biology, forestry, or plant materials.

FOR 409 TREE PHYSIOLOGY (2) Fundamentals of the relationship of the basic physiological functions of forest trees to form. Prerequisite: BIOL 240W

FOR 410 ELEMENTS OF FOREST ECOSYSTEM MANAGEMENT (3) Fundamentals of forest ecosystem management for goods and services. Prerequisite: 3 credits in both ecology and biology.

FOR 416 FOREST RECREATION (3) The management and administration of multiple-use forest lands and wilderness for forest recreational experiences, with emphasis on public forests. Prerequisite: 3 credits in social or behavioral science.

FOR 418 US/IL AGROFORESTRY: SCIENCE, DESIGN, AND PRACTICE (3) Agroforestry integrates trees in agricultural landscapes, and/or agriculture products into forested areas for multiple benefits.

FOR 421 SILVICULTURE (3) The application of the principles of forest ecology to control of establishment, composition, and growth of forest stands. Prerequisite: FOR 308, FOR 366

FOR 430 (W F S) CONSERVATION BIOLOGY (3) The application of biological principles to issues in the conservation of biodiversity. Prerequisite: BIOL 220W or FOR 308.

FOR 440 FOREST ECONOMICS AND FINANCE (3) The application of economic theory to forest resources systems, with emphasis on production and investment analyses. Prerequisite: ECON 002 or ECON 004.

FOR 455 REMOTE SENSING AND SPATIAL DATA HANDLING (3) Remote sensing systems, with emphasis on application to forest ecosystem analysis. Includes introduction to computer systems for spatial data handling. Prerequisite: MATH 110, 3 credits in computer science, 6 credits in ecological and/or geological sciences.

FOR 466W FOREST RESOURCE MANAGEMENT (3) Optimum use of forest's tangible and intangible resources by application of financial and administrative management principles and management science techniques. Prerequisite: FOR 421. Prerequisite or concurrent: FOR 440.

FOR 470 WATERSHED MANAGEMENT (3) Management of wild land watersheds for control of the amount and timing of water yield, water quality, erosion, and sedimentation. Prerequisite: 3 credits in Soils.

FOR 471 WATERSHED MANAGEMENT LABORATORY (1) Introduction to hydrologic and climatic measurements and computations useful in watershed management. Prerequisite or concurrent: FOR 470.

FOR 475 PRINCIPLES OF FOREST SOILS MANAGEMENT (3) Effect of current forest management practices on the properties and productive capacity of forest soils. Prerequisite: FOR 308 and 3 credits in soils.

FOR 480 POLICY AND ADMINISTRATION (3) Forest resources policy objectives; criteria and goals of society; policy implementation by ownership classes; planning, administration, and evaluation of programs. Prerequisite: FOR 200W, 3 credits of social or behavioral science.

FOR 488Y IL INTERNATIONAL FORESTRY (3) Forestry in global context, emphasizing developing countries: ecological, economic, technological, and political aspects. Prerequisite: E R M 413W, FOR 421, or INTAG100.

FOR 494 FORESTRY RESEARCH (3) Introduction to the theory, principles, and practices of forestry research; supervised research experience. Prerequisite: FOR 350, STAT 250

FOR 495 FORESTRY INTERNSHIP (1-6) Supervised field experience related to the student's major.
Prerequisite: approval of proposed assignment by instructor prior to registration.

FOR 496 INDEPENDENT STUDIES (1-18)

FOR 497 SPECIAL TOPICS (1-9)

FOR 499 IL FOREIGN STUDIES (1-12)

GEOG 110 GN CLIMATES OF THE WORLD (3) Introduction to climatology, including principal processes of the global climatic system and their variation over space and time.

GEOG 115 GN LANDFORMS OF THE WORLD (3) Distribution of the world's landform features and mineral resources; their characteristics, causes, and significance. Practicum includes correlated field trips and laboratory studies.

GEOG 122 GH/US THE AMERICAN SCENE (3) Historical perspectives on the social and cultural forces associated with the production of distinctive American landscapes.

GEOG 160 GS MAPPING OUR CHANGING WORLD (3) Fundamental concepts of GIS, cartography, remote sensing, and GPS in the context of environmental and social problems.

GEOG 362 IMAGE ANALYSIS (3) Introduction to the basic principles of remote sensing and the analysis of aerial and satellite data. Prerequisite: GEOG 160.

GEOG 364 SPATIAL ANALYSIS 1 (3) Geographic measurement, scaling, and classification; analysis of spatial pattern and structure; geographic covariation and autocorrelation. Prerequisite: 6 credits in social science.

GEOSC 001 PHYSICAL GEOLOGY (3) Earth processes and their effects on the materials, structure, and morphology of the earth's crust. Practicum includes field work, study of rocks, minerals, dynamic models, and topographic maps. (This course includes from one to several field trips for which an additional charge will be made to cover transportation.)

GEOSC 002 GN HISTORICAL GEOLOGY (3) Hydrologic cycle: occurrence, movement, quality, and quantity of groundwater; quantitative geologic and hydrologic methods; role of water in geologic processes. This course has one or more required field trips for which a fee is charged to the student. Prerequisite: CHEM 013; GEOSC 001, GEOSC 020, or GEOSC 071; and fifth-semester standing.

GEOSC 010 GN GEOLOGY OF THE NATIONAL PARKS (3) Introduction to geology, geological change, and environmental hazards, as seen in the National Parks.

GEOSC 452 HYDROGEOLOGY (3). Hydrologic cycle: occurrence, movement, quality, and quantity of groundwater; quantitative geologic and hydrologic methods; role of water in geologic processes. Prerequisite: CHEM 112; GEOSC 001, GEOSC 020, GEOSC 071, MATH 140 OR MATH 110.

HORT 138 ORNAMENTAL PLANT MATERIALS (2-3) Identification and description under spring conditions; discussion of cultural and aesthetic aspects of shrubs of value in ornamental plantings.

HORT 408 LANDSCAPE MAINTENANCE AND MANAGEMENT (4) The principles and practices involved in the establishment of plants in the landscape, and their subsequent maintenance. Prerequisite: HORT 137 or HORT 138; SOILS 101.

LARCH 003 GA THE NATURAL AND HISTORIC LANDSCAPE (3) Man's changing attitudes toward urban and rural outdoor spaces and their aesthetic and cultural value.

LARCH 060 GA HISTORY OF LANDSCAPE ARCHITECTURE (3) A survey of the historical development of outdoor space in relationship to allied arts from early beginnings to this century.

LARCH 241 VEGETATION ECOLOGY AND LANDSCAPE DESIGN (3) Application of ecological knowledge to landscape design and management with particular emphasis on the use of plant communities in contemporary design.

MATH 110 GQ TECHNIQUES OF CALCULUS I (4) Functions, graphs, derivatives, integrals, techniques of differentiation and integration, exponentials, improper integrals, applications. Students may only take one course for credit from MATH 110, 140, 140A, and 140B. Prerequisite: MATH 022 or satisfactory performance on proficiency examination.

MATH 111 GQ TECHNIQUES OF CALCULUS II (2) Analytic geometry, partial differentiation, maxima and minima, differential equations. Prerequisite: MATH 110.

MATH 140 GQ CALCULUS WITH ANALYTIC GEOMETRY I (4) Functions, limits; analytic geometry; derivatives, differentials, applications; integrals, applications. Students may only take one course for credit from MATH 110, 140, 140A, and 140B. Prerequisite: MATH 022, MATH 026; or MATH 040 or MATH 041; or satisfactory performance on the mathematics proficiency examination.

MATH 141 GQ CALCULUS WITH ANALYTIC GEOMETRY II (4) Derivatives, integrals, applications; sequences and series; analytic geometry; polar coordinates. Students may take only one course for credit from MATH 141 and 141B. Prerequisite: MATH 140, MATH 140A, or MATH 140B.

METEO 003 GN INTRODUCTORY METEOROLOGY (3) Nontechnical treatment of fundamentals of modern meteorology; effect of water and climate on man and his activities. A student who took METEO 002 may take the laboratory part of this course for 1 credit only.

MICRB 201 INTRODUCTION ENVIRONMENTAL MICROBIOLOGY (2) Elementary ecological relationships of microorganisms in the biosphere; role of bacteria in water pollution and purification. This course should not be scheduled by students who have taken MICRB 201 or 202. Prerequisite: CHEM 202.

MGMT 100 SURVEY OF MANAGEMENT (3) Introduction to organizational factors relevant to management processes, including leadership, motivation, job design, technology, organizational design and environments, systems, change. May not be used to satisfy Smeal College baccalaureate degree requirements. Not available to students who have taken B A 304 or MGMT 301.

MGMT 341 HUMAN RESOURCE MANAGEMENT (3) Introduction to the strategic planning and implementation of human resources management, including staffing, development, appraisal, and rewards. Prerequisite: B A 304, MGMT 100, or MGMT 301.

P PATH 318 DISEASES OF FOREST AND SHADE TREES (2) Introduction to diagnosis and control of forest and shade tree diseases.

PHYS 250 GN INTRODUCTORY PHYSICS I (4) Selected topics in mechanics, heat, and sound. Prerequisite: MATH 022, MATH 026; or MATH 040; or MATH 041 or satisfactory performance on math proficiency exam. W F S students must take both lecture and practicum.

PHYS 251 GN INTRODUCTORY PHYSICS II (4) Selected topics in light, electricity, magnetism. Prerequisite or concurrent: PHYS 250 GN. FORSC students must register for both PHYS 251 and PHYS 251P.

PL SC 001 GS INTRODUCTION TO AMERICAN NATIONAL GOVERNMENT (3) Introduction to development and nature of American political culture, constitution/structural arrangements, electoral/policy processes; sources of conflict and consensus.

PL SC 125 PENNSYLVANIA GOVERNMENT AND POLITICS (3) Pennsylvania political processes; executive, legislative, judicial decision making, and electoral behavior; selected public policies.

PL SC 417 AMERICAN LOCAL GOVERNMENT AND ADMINISTRATION (3) Organization, powers, functions, and problems of American cities and metropolitan areas; modern trends and developments. Prerequisites: PL SC 001.

PL SC 419 THE BUREAUCRATIC STATE (3) Overview of structural, technological, decision- making, behavioral, and political subsystems of bureaucracy; emphasis on bureaucratic dynamics within larger environmental, interorganizational contexts. Prerequisite: PL SC 001 or 002.

SOILS 101 INTRODUCTION TO SOILS (3) A study of the characteristics of soils and their influence on land use, environmental quality, plant growth, and society/culture.

SOILS 422 NATURAL RESOURCES CONSERVATION AND COMMUNITY SUSTAINABILITY (3) Water and wind erosion processes, principles of control practices, and training in conservation planning. Prerequisite: SOILS 101.

STAT 240 GQ. INTRODUCTION TO BIOMETRY (3) Statistical analysis, sampling, and experimentation in the agricultural sciences; data collection, descriptive statistics, statistical inference, regression, one factor AOV, probability. Students may take only one course from STAT 200, 220, 240, 250 for credit. Prerequisite: 3 credits in mathematics.

W F S 209 GN, WILDLIFE AND FISHERIES CONSERVATION (3) Survey of current and historical issues in wildlife and fisheries conservation; emphasis on vertebrate biodiversity, habitat management and protection, and populations. Prerequisite: BIOL 110 or BIOL 240W

W F S/E R M 435. LIMNOLOGY (3) Biogeochemistry and natural history of freshwater ecosystems. Prerequisite: BIOL 110 , BIOL 220W , CHEM 110.

W P 203 ANATOMICAL PROPERTIES OF WOOD (1) Information on tree form and growth, cell wall formation and composition, and structure of wood and bark cells. Macroscopic and microscopic identification of hardwood and softwood cells. Concurrent: FOR 200W and FOR 203.

Ecosystem Science and Management Undergraduate Course Offerings by Semester at University Park

These offerings are subject to change as circumstances require

Course	Title (cr.)	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
FOR 200W	Careers in For Resources (3)	X		X		X		X	
FOR 203	Field Dendrology (3)	X		X		X		X	
FOR 204	Dendrology (2)		X		X		X		X
FOR 308	Forest Ecology (3)	X		X		X		X	
FOR 320	Forest Fire Mgmt (2)		X		X		X		X
FOR 350	For Resources Biometrics (3)		X		X		X		X
FOR 366	For Res Measurements (4)		X		X		X		X
FOR 401	Urban Forest Mgmt (3)	X		X		X		X	

Course	Title (cr.)	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
FOR 409	Tree Physiology (2)		X				X		
FOR 410	Forest Ecosystem Mgmt (3)				X		X		X
FOR 416	Forest Recreation (3)								
FOR 418	Agroforestry (3)				X				X
FOR 421	Silviculture (3)	X		X		X		X	
FOR/W F S 430	Conservation Biology (3)	X		X		X		X	
FOR 439	Timber Sale Administration (3)	X		X				X	
FOR 440	Forest Econ & Finance (3)	X		X		X		X	
FOR 455	Rem Sens & Spa Dat (3)	X		X		X		X	
FOR 466W	For Resource Mgmt (3)		X		X		X		X
FOR 470	Watershed Management (3)		X		X		X		X
FOR 471	Watershed Mgmt Lab (1)		X		X		X		X
FOR 475	Forest Soils Mgmt (3)			X		X		X	
FOR 480	Policy & Administration (3)	X			X		X		X
FOR 488Y	International Forestry (3)		X				X		
W F S 209	Wild/Fish Conservation (3)	X	X	X	X	X	X	X	X
W F S 300	The Vertebrates (2)	X		X		X		X	
W F S 301	Vertebrate Laboratory (2)	X		X		X		X	
W F S 310	W F S Measurements (3)	X		X		X		X	
W F S 406	Ornithology Lab (1)		X		X		X		X
W F S 407	Ornithology (3)		X		X		X		X
W F S 408	Mammalogy (3)		X		X		X		X
W F S 409	Mammalogy Lab (1)		X		X		X		X
W F S 410	Fisheries Science (3)	X		X		X		X	
W F S 422	Ecology of Fish (3)	X				X			
W F S/FOR 430	Conservation Biology (3)	X		X		X		X	
W F S/E R M 435	Limnology (3)	X		X		X		X	
W F S 440	Nat Res Public Relations (3)								
W F S 446	Wildl Fish Pop Dyn (3)		X		X		X		X
W F S 447W	Wildl Management (3)	X		X		X		X	
W F S/E R M 450	Wetlands Conservation (3)	X		X		X		X	
W F S 452	Ichthyology (2)	X		X		X		X	
W F S 453	Ichthyology Lab (2)	X		X		X		X	
W F S 460	Wildlife Behavior (3)	X		X		X		X	
W F S 462	Amphibians and Reptiles (3)		X		X		X		X
W F S 463W	Fishery Management (3)		X		X		X		X
W P 200W	Careers in Forest Res (3)								
W P 203	Anatomical Prop Wd (1)	X		X		X		X	
W P 337	Wood Technology (2)				X				X
W P 400	Properties of Wood (3)		X				X		
W P 411	Wood-Environ Relations (4)	X				X			
W P 412	Wood in Structures (3)		X				X		
W P 413	Chemistry of Wood (4)			X				X	
W P 416	Wood Industries Mgt Dev (3)			X				X	
W P 417	W P Mfr Sys and Proc (4)				X				X
W P 418	Chem Proc of Wood (4)			X		X			

Course	Title (cr.)	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016
W P 423	Deterior and Protect (2)		X				X		
W P 435	W P Prod Mgmt (3)		X				X		
W P 437W	Wood Ind Mktg Mgmt (4)				X				X
W P 438	Bus Concepts in Wood Mfg (4)	X				X		X	
W P 460	W P Ind Envir Ctrl (3)								
W P 490	W P Colloquium (1)		X				X		

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