FOREST ECOLOGY: Course Syllabus

I. Course Description

Forest ecosystems are volumetric, layered segments of the Earth's skin where plants and animals occur in dynamic association with their non-living environment (atmosphere, physiography, and soil). This is a field-intensive course emphasizing forested landscape ecosystems and plant species of the Mid-Atlantic. Our challenge is to understand ecosystems, their physical and biotic characteristics, their relationship to one another in the field, successional trends, and selected aspects of their functioning. This course will stress forest species, and especially (1) field identification and characteristic habitats, (2) establishment ecology, (3) competitive and mutualistic relationships, (4) occurrence and diversity related to habitat conditions, (3) establishment and occurrence in relatively undisturbed (by humans) and disturbed environments, and (6) genetic and non genetic variation of populations, as well as adaptation to specific environments.

II. Prerequisites

GES 308 OR BIO 301

III. Course Text

Barnes, Denton, Zak, and Spurr. 1998. "Forest Ecology". Wiley.

IV. Course Objectives

1. Critically examine ecological principles in a variety of field situations.
2. To think holistically about landscape ecosystems rather than single factors such as plants or soil.
3. To learn how to distinguish and analyze forest ecosystems in a systematic fashion, including plant identification and soil assessment.
4. To understand niche relationships of forest species and the genetic and physiological basis of these relationships.
5. To examine the impact of disturbance caused by anthropogenic activity on the abiotic environment, community composition, and species populations.
6. To learn field and lab skills in sampling forested ecosystems and analyzing the data collected.

V. Course Content and Approach

Lectures will provide an introduction to organismic biology and autecology including phenotypic variation and regeneration; forest structure and growth; forest ecosystem components including climate, physiography, and soil; forest dynamics including disturbance, succession, and nutrient cycling; and landscape ecology. We will develop an understanding of ecosystem diversity through comparative analysis of forested ecosystems of the Mid-Atlantic region.

Field labs will consist of studying ecosystems from a holistic perspective, so accurate identification of plant species, map reading, interpretation of soil profiles, and good measurement skills are a basic necessity of the course. Learning names is a foundational framework for the study of biology, ecology, natural history, and all applied aspects of ecosystem management. Therefore, it is important to resolve any problems

you may have about memorization right away.

VI. Field Procedures

We go out on a field trip (Laboratory) from 2:30pm to 5:30pm every Thursday afternoon. Vehicles will depart promptly at 2:40pm so make sure you are on time. We go out rain or shine so please come prepared! We expect you to study plants (nomenclature, fresh specimens, twigs, fruits, or descriptions) BEFORE seeing them in the field. Following the first week, fresh specimens of assigned plants for the current week will be available in the Environmental Science lab on Monday. In addition to weekly labs, there will be two all-day field trips, and one is mandatory.

VII. Evaluation

Field quizzes may be given each week. There will be 5 quizzes, 2 in class examinations, and 2 field examinations. For the quizzes and field examinations you are responsible for material covered in field and analytical laboratory periods. In class examinations will cover lectures, readings, and laboratory material. In addition, graduate students will be required to write a brief research paper on a forest ecology specialty of their choosing.

VIII. Learning and Identifying Plants

1. When learning a plant, visualize the whole plant—its form and then its characteristics. One cannot learn the characters by simply staring at them. Instead, form a mental image of the characters in your mind as you study.
2. Concentrate your time on the major key characters of the plant that distinguish it from other closely related plants. Be keen about screening unimportant characters. Be patient with this because it gets easier with experience.
3. Study the plants indoors and outdoors several times a week.
4. Learn the plant names in this order (1) family name, (2) genus and species names, (3) common name. Work out a system for memorizing the names and associating the names with the plants.
5. Learn plants in related taxonomic groups (e.g., oaks, maples, pines, etc.) and also learn them by their habitats. Learn plant names before you go into the field.
6. In the field, make sure to examine the plant yourself, do not simply copy down oral descriptions. Many students use a notecard for jotting down key features.
7. Repetition, repetition, repetition. Practice where ever you go. Even if you do not know the plant, practice observational analysis.
8. Identification does not rely solely on a single character. Think of identification as building a line of evidence. Look for several key characters that work for you and also consider characters that would invalidate your best guess. Watch out you do not memorize a particular shape or color of an individual example.

IX. First Assignment

Before the first lab, read pages 1-45 of Michigan Trees (posted on Bb course site). Learn the general leaf shapes, margins, surfaces etc., the fruit types, and twig characters. The lab won't be so full of strange terms if you do. Review the plant list below.

Plant list for lab #1

	Family	Genus	Species	Common Name
a.	Aceraceae	Acer	negundo	Box-elder, Ash-leaf maple
b.	Aceraceae	Acer	rubrum	Red maple
c.	Aceraceae	Acer	saccharinum	Silver maple
d.	Anacardiaceae	Toxicodendron	radicans	Poison ivy
e.	Caprifoliaceae	Viburnum	acerifolium	Mapleleaf viburnum
f.	Celastraceae	Euonymous	alata	Winged wahoo
g.	Cornaceae	Cornus	florida	Flowering dogwood
h.	Fagaceae	Fagus	grandifolia	American beech
i.	Fagaceae	Quercus	alba	White oak
j.	Fagaceae	Quercus	coccinea	Scarlet oak
k.	Fabaceae	Robinia	pseudoacacia	Black locust
l.	Juglandaceae	Carya	cordiformis	Bitternut hickory
m.	Liliaceae	Smilax	tamnoides	Bristly greenbriar
n.	Magnoliaceae	Liriodendron	tulipifera	Tuliptree, Yellow-poplar
o.	Nyssaceae	Nyssa	sylvatica	Blackgum, Black tupelo
p.	Oleaceae	Fraxinus	americana	White ash
q.	Oleaceae	Fraxinus	pennsylvanica	Green ash, Red Ash
r.	Platanaceae	Platanus	occidentalis	Sycamore
s.	Rosaceae	Prunus	serotina	Black cherry
t.	Rosaceae	Crataegus	spp.	Hawthorn, Crab-apple
u.	Rhamnaceae	Rhamnus	cathartica	Common buckthorn
v.	Ulmaceae	Ulmus	americana	American Elm

Forest Ecology: Class Outline

Tu Sept 1 Introduction, plants and habitats, vegetative morphology
Th Sept 3 **LAB**: UMBC Campus: Field Identification & Nat. History

Tu Sept 8 Phenotypic & Genetic Variation
Th Sept 10 **LAB**: Gwynns Falls: More Identification & Nat. History

Tu Sept 15 Regeneration and Fruit Types
Th Sept 17 **LAB**: UMBC Campus: Ecosystem Analysis

Tu Sept 22 Forest Structure, Light, & Growth
Th Sept 24 **LAB**: Rhode River: Coastal Plain Second Growth

Tu Sept 29 Climate, Zonation, Temperature, and Long-term Change
Th Oct 1 **LAB**: Oregon Ridge: Piedmont Second Growth
[Sat Oct 3rd All Day Field Trip #1: Appalachia]
Tu Oct 6 Physiography and Soils
Th Oct 8 **LAB**: Analysis and Interpretation, Review

Tu Oct 13 **MIDTERM EXAM**
Th Oct 15 **LAB**: Patapsco State Park: The Floodplain Forest
[Sat Oct 17th All Day Field Trip #2: Delmarva]
Tu Oct 20 NO CLASS
Th Oct 22 **LAB**: Analysis, Interpretation, & Review

Tu Oct 27 Site Quality and Forest Communities
Th Oct 29 **LAB EXAM I: Halloween Howl**

Tu Nov 3 Fire, Disturbance
Th Nov 5 **LAB**: Belt Woods: Old-Growth Forest

Tu Nov 10 Disturbance and Forest Succession
Th Nov 5 **LAB**: Location TBA: Transect Study

Tu Nov 17 Carbon Balance, Nutrient Cycling
Th Nov 5 **LAB**: Analysis & Interpretation

Tu Nov 24 Diversity
Th Nov 26 THANKSGIVING

Tu Dec 1 Landscape Ecology
Th Dec 3 **LAB**: Ecosystem Mapping

Tu Dec 7 Synthesis and Review
Th Dec 10 **LAB EXAM II: Ecosystem of Mystery**
Th Dec 17 **FINAL EXAM 1pm-3pm**