WOODY PLANTS: ECOLOGY, NATURAL HISTORY AND IDENTIFICATION
COURSE SYLLABUS

I. CONTENT AND APPROACH. Woody plants are part of ecological systems -- forests and woodlands of the Earth's landscape. Such landscape ecosystems are volumetric, layered segments of the Earth's skin where plants and animals occur in dynamic interaction with the physical site factors (atmosphere, physiography, and soil) and with each other. In Woody Plants, we stress their ecology, natural history and identification by learning woody plants in the ecosystems and communities where they naturally occur as individuals.

In the course, woody plant identification is the basis for the study of their ecology, natural history, and biology. The identification portion is taught primarily in the field. The plants are studied in natural habitats as far as possible. The ecosystems visited include three beech-sugar maple forests, four oak-hickory forests, two river floodplain forests, a second-growth forest on an old lake plain, swamps and bogs, roadsides, and several highly disturbed sites. We also study plants not native in Michigan by visiting plantations in Stinchfield Woods. In addition to the important characteristics, in the field labs we stress important natural history features of many plants.

In lecture, an introduction to the ecology, biology, and natural history of woody plants is presented. The general topics are: morphology and anatomy of vegetative and reproductive parts, the physical environment (geology, soils, climate, light), reproductive ecology (pollination, dispersal, establishment), community concepts (species interactions, disturbance, succession), biogeography (post glacial forest assembly, fire, related forest biomes) and human impacts on woody plants (climate change, invasive species, pollution and landscape fragmentation).

The field labs consist of studying the plants in many different sites and associating the scientific and common names with their characters. Developing a system for memorizing plant names and associating them with the plants **is a basic necessity of the course!** Learning names is the basic foundation and framework for the study of the biology, ecology, natural history, and all applied aspects of ecology and ecosystem management. Therefore, it is important to resolve any problems you have about memorization right away. Your instructor and GSIs are interested to help you. Throughout your career you will be working with the same families, genera, and often the same species you learn in Woody Plants. The names will be used again in many of your other courses.

SIGNIFICANCE OF FIELD STUDY. The heart of ecosystem conservation and management is field studies—learning biota in Nature--not second hand via videos and computers. We focus on woody plants that are the dominant organisms and key structural parts of forest and woodland ecosystems, i.e., landscape ecosystems. Woody plant identification and natural history are studied in a rich variety of field sites that experience light irradiance, precipitation, seasonal changes, and disturbances, seen and unseen. For a little while each week, you'll share a little bit of Nature—always nice, rain or shine! We hope you'll make the most of it!

II. FIELD PROCEDURES. You'll go with us on a field trip (lab) from 1 to 6 PM once each week on either Tuesday, Wednesday or Thursday afternoon. We go out **rain or shine**, so please come prepared! We expect you to study the plants (fresh specimens and herbarium sheets, twigs and fruits) in the indoor study lab—2520 Dana—and learn their names **before** seeing them in the field. Fresh specimens and herbarium speciems will be available the previous Friday afternoon. Therefore, use your plant list and your text to study the species **before** going on the field trip.

The vans for each field trip leave **promptly** at 1:00 p.m. The pick-up point will be announced in class (Probably at the North entrance of the parking structure in Church St).

STUDY LAB: ROOM 2520 DANA Lab will be open and available for study at all times except for Tuesday and Thursday mornings (10 am-12 pm).

III. COURSE INSTRUCTORS. You will be assigned a Graduate Student Instructor for the field trip who will be your permanent field instructor for the course.

Professor:

Inés Ibáñez email: iibanez@umich.edu;
office hours: Tuesdays 2-4 pm or by appointment (Dana 2546)

GSI's

Abigail Potts, abpotts@umich.edu

Jack Pritchard, jdpritch@umich.edu
Sam Schaffer-Morrison, samsm@umich.edu

Collector:

Gucci Fan, gucc@umich.edu

IV. STUDY MATERIALS.

A. One book is required: The 2004, 2nd edition of **Michigan Trees** by Barnes and Wagner, ISBN ISBN-13: 978-0472089215. A new **Michigan Shrubs and Vines** by Barnes, Dick and Gunn is highly recomended, ISBN 978-0-472-03625-7

B. **Canvas site.** Materials previously contained in a coursepack have been placed in digital form on the Canvas website. This includes (1) syllabus, (2) lecture images, (3) field sites descriptions and list of species, and (4) additional identification materials.

In addition, there are several other books you may want to read in the library or buy for your study and your reference in years to come:

1. **The Shrubs of Ontario** by Soper and Heimburger. Shrubs and small trees. Detailed descriptions of shrubs of Ontario and the Great Lakes Region, including Michigan. Excellent illustrations and range maps. Some copies available in bookstores.
2. **Textbook of Dendrology** by Hardin et al., 9th edition (2001). Trees only. Good descriptions, pictures, and range maps; a discussion of habitat and uses of the major trees of North America is presented; an excellent reference book with North American coverage.
3. **Fruit Key and Twig Key to Trees and Shrubs** (1959) by Harlow. A handy, inexpensive guide to fruit and twig characters. Highly recommended!
4. **Trees of the Northern United States and Canada** by J. L. Farrar (1995). Trees only. Outstanding dendrology book, but limited to northern species. Great pictures and drawings; includes many of the species we assign; highly recommended.
5. **Michigan Flora, Vol. 1, 2, and 3**, by Ed Voss, Botanist and Curator, University of Michigan Herbarium. These volumes will make an important addition to any reference collection, with excellent keys to many of the woody plant families, genera and species studied in this course. These volumes may be purchased at the University Herbarium, 2003 NU Bldg.
6. **Botany Illustrated**, by J. Glimn-Lacy and P.B. Kaufman (2006), Springer. Another UM jewel, a great way to learn plant morphology and the major flowering plant families.
7. **Trees of Michigan**, by L. Kershaw (2006), Lone Pines. It includes shrubs and distributional maps, also a key for some of the twigs.

Fresh Specimens. Fresh specimens of the assigned plants for the following week will be available in the study lab--2520 Dana--each Friday afternoon. Be sure to use your plant list and study the plants assigned for the week **before** you go out in the field. Learn the plant names and use your texts, study the fresh materials and herbarium sheets before going into the field on Tuesday, Wednesday or Thursday afternoon. The fresh specimens will be kept in the lab for two weeks for your study and review. The study lab is always open whenever the Dana Building is open. There will be descriptions of each field site with the list of assigned species, this material will be posted a week before the lab. Because we can ensure we will be able to find all the species we will post an official plant list of assigned species. This list will be updated each Friday with the species assigned for the following week.

Herbarium Sheets, Twigs, Cones, Fruits. Herbarium sheets of the assigned plants will accompany fresh specimens by Friday of each week. Please examine the specimens, but do not remove or mutilate the sheets.

In one place in the lab the available fruits will be displayed. We do not have all the fruits so it is important for you to study the fruits in your text. The required twigs will be put out for study on one of the tables in the lab; **handle these twigs with extreme care**. Look at, but do not touch the buds! Later in the course the cones of the required conifers will be set out for study.

V. QUIZZES, EXAMS, COLLECTION, GRADING. Field quizzes or exams will be given each week beginning Tuesday, Wednesday, and Thursday September 17,18,19. There will be 6 quizzes and 2 field exams. You will have a practice quiz during the first lab. For the quizzes and field exams you are responsible for all plants you have been assigned in previous labs and for the names and major characters of plants of the **current week**. In addition, you are responsible for the habitat, range, and natural history aspects of the plants that have been brought out by your instructors in lab or in lecture. Some quizzes may be solely plant identification, usually of fresh specimens (leaves, twigs, bark, fruit, etc.). Other quizzes will require **written answers**, i.e., descriptions of contrasts of various genera or species, questions on identification terminology, and on the range, habitat, and natural history features of the species. Sometimes there may be combinations of field identification and written questions.

Collection. For your final class assignment you will have to bring a herbarium collection of **70** woody plant species. These need to be species learnt during the labs. All specimen should have leaves and provide enough material to be able to identify the species. We will provide guidelines during the lecture time about how to prepare, label and document the plants. Labels shouls included: scientific name, family, common name, day collected and geographic coordinates of the collection location. You will have to collect and identify these specimens on your own time. Students WILL NOT BE ALLOWED to collect specimens at the class field labs at any time or from the Arb, neither use any of the fresh and dry material provided in the lab. START EARLY, even if you don't know the plants yet collect as many as you can early in the semester when they still have leaves. The herbarium exams will take place during the last lab period **December: 3,4,5**.

Lecture Exams. There will be 2 examinations based on lecture material. A midterm exam is scheduled **at class time**, 9:00-10:00 a.m. on **Tuesday, October 22**. For the final exam you will have to dates to take it, during the last class period (**Tuesday December 10, 9:00 -10:00 am**) ot the day assigned by the university (**Wednesday December 18, 1:30-3:30 pm**).

Grading. The lecture exams will count 30% of the course grade (10% midterm, 20% final). Quizzes, collection and field exams will count 70% of the grade (approximate breakdown: quizzes 10%, midsemester field exam 15%, final field exam 20%, collection 25%). The 5 best quizzes will be used to determine the quiz score.

Grade assignments:

95.1-100	A+
90-95	A
88-89.99	A-
86-87.99	B+
80-85.99	B
78-79.99	B-
76-77.99	C+
70-75.99	C
68-69.99	C-
66-67.99	D+
60-65.99	D
58-59.99	D-
<=57.99	F

Dropping The Course. People love Woody Plants! It's TOOooo MUCH! It's the "Gateway Drug." However, people have been known to do poorly and even fail the course. It is important to attend every lab and lecture and **use the study lab regularly** to avoid getting behind. Monitor your progress carefully; if you wish to drop, do so within the regular drop and add period.

Quizzes, exams and herbarium collection fall under the University of Michigan LSA and SEAS honor system.

VI. LEARNING THE PLANTS. To do well in the course, and **know your plants**, you should develop a **system** of study—a systematic way of organizing the species by family and genus. Here are some study tips:

1. **Use the Keys.**
2. When learning a species, visualize the whole plant--its form and then its characteristics. One can't learn the characters by simply staring at them. Instead, form a mental image of the characters in your mind as you study the plants.
3. Concentrate your time on the key characters of the plant that distinguish it from other closely related plants. Be keen on screening out the unimportant characters. Be patient with this because it will come with experience! Your GSIs can assist you in pointing out what to look for. **Key characters** are described in Michigan Trees on the page with the diagrams of plant characteristics.
4. Study plants in the indoor lab **several times each week**.
5. 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. **Always learn the names before you go in the field**.
6. Learn the plants in the related taxonomic groups (oaks, ashes, pines, etc.); also learn them by their habitats.
7. In the field, examine and study the plant yourself--don't simply copy down the oral descriptions given by the GSI. Be sure to memorize the plant names before going out in the field.
8. Many successful students use 5 x 7" cards on which they draw a sketch of the leaf and other important characters. In addition, they jot down the major distinguishing features. A notebook of 8-1/2 x 11" paper may also be used for drawing and notes.
9. **Keep current**! Avoid getting behind! You can do very well in the course by not missing a field trip or lecture and by repeated study of plants in the indoor lab. Learn the names and the major characteristics in the study lab **before going out in the field**. Always work a week ahead; this is the single most important study tip for doing well in the course. **Last minute cramming** can lead to disaster, so plan your cram! You can't play "catch up" in Woody Plants!
10. **Repetition. Repetition. Repetition.** Set aside some time each day or several times a week to study the new plants and review the ones you have already seen in the field.
11. In identification, don't rely on a single plant character -- it's bound to fail. There are usually several key characters you can use. So look for several characters that **work for you**. Watch out you don't memorize the particular color or shape of the plant on the herbarium sheet. Go in the field to review on your own and use different books to study the characters. Many species from the different sites and habitats we visit can be reviewed in the Arboretum and on or nearby Campus. All instructors can suggest wild field sites for a hike or a bike foray.

VII. FIRST ASSIGNMENT.

1. Before the first lab read pages 1-23 in **Michigan Trees**. Learn the general leaf shapes, margins, surfaces, etc., the fruit types, and the twig characters. The first lab won't be so full of strange terms if you do.
2. Before going out in the first lab, study the plant specimens in the study lab, 2520 Dana

VIII. ACADEMIC ACCOMMODATIONS.

If you need any particular accommodations for a disability please let your instructors and Services for Students with Disabilities (SSD) know, we will work to the best of our abilities to address your needs. Any information provided will be treated as confidential.

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Lecture Outline – 2019

Tu Sept. 3 Course overview

PART I: THE BASES FOR PLANT IDENTIFICATION

Th Sept. 5 Plant morphology - Vegetative – dichotomous keys

Tu Sept. 10 Plant morphology - Vegetative – dichotomous keys

Th Sept. 12 Plant morphology - Reproductive – interactive keys

PART II: THE PHYSICAL ENVIRONMENT

Tu Sept. 17 The physical environment - glacial landforms

Th Sept. 19 The physical environment –soils I

Tu Sept. 24 The physical environment –soils II

Th Sept. 26 The physical environment - light

Tu Oct. 1 The physical environment – temperature and precipitation

PART III: PLANT COMMUNITIES

Th Oct. 3 Reproductive ecology I: Pollination and Seed dispersal

Tu Oct. 8 Reproductive ecology II: Seed dormancy and germination, seedling establishment

Th Oct. 10 Species interactions

Tu Oct. 15 **Fall break**

Th Oct. 17 Plant Soil Feedbacks

Tu Oct. 22 **Lecture Midterm Examination**

Th Oct. 24 Disturbance

Tu Oct. 29 Succession

PART IV: BIOGEOGRAPHY

Th Oct. 31 Pleistocene & post glacial forest assembly

Tu Nov. 5 Fire and postsettlement forests

Th Nov. 7 Campus walk. Be on time!

Tu Nov. 12 Related Forest Biomes of North America: Taiga and Boreal Forests

Th Nov. 14 Related Forest Biomes of North America: Eastern Deciduous Forests

PART V: HUMAN IMPACTS

Tu Nov. 19 Climate change

Th Nov. 21 Landscape fragmentation

Tu Nov. 26 Pollution

Th Nov. 28 **Thanksgiving**

Tu Dec. 3 Emerging pests & Invasive species

Th Dec. 5 Dissecting Michigan's landscapes - Review session and Synopsis

Tu Dec. 10 **Lecture Final Examination Option I (December 10, 9:00-10:00 qm)**

Th Dec. 18 **Lecture Final Examination Option II (December 18, 1:30-3:30 pm)**

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SCHEDULE OF FIELD TRIPS AND LAB EXAMS - 2019

Lab #	Data	Location
1	Sept. 10,11,12	Miller's Woods: Beech-sugar Maple forest ecosystem
2	Sept. 17,18,19	Radrick Forest: Old-growth Oak-Hickory ecosystems
3	Sept. 24,25,26	Waterloo Recreation Area: Oak-Hickory ecosystems; Swamps
4	Oct. 1,2,3	Haven Hill: Dry Oak Forest; Wet-mesic Forests; Swamp
5	Oct. 8,9,10	Lawrence Woodlot: Oak Forests; second-growth forests on old lake plain; sandy, seasonally wet terrain
	Oct. 15,16,17	**Fall break**
6	Oct. 22,23,24	Ecosystems and Woody Plants of Mystery **Field Identification Exam I**
7	Oct. 29, 30, 31	Lower Huron Park: River floodplain forests; levee and first bottom, mostly dry in November.
8	Nov. 5,6,7	Mud Lake Bog: Swamp and bog ecosystems. Wet! Cold! Muck! Exciting!

		Campus walk. During lecture period (we'll start at 9 am).
9	Nov. 12,13,14	Huron River and Stinchfield Woods: River floodplain hardwoods and conifer plantations; roadsides and dry uplands
10	Nov. 19,20,21	Ecosystems and Woody Plants of Mystery. Cold!
		Field Identification Exam II
	Nov. 26,27,28	**Thanksgiving**
11	Dec. 3,4,5	**Herbarium Collection Indoor Exam**