

## **Syllabus: Herbaceous Flora and Ecosystems. EAS 501.003 (lecture) and lab sections .004 & .005**

### **Herbaceous Flora and Ecosystems**

EAS 501.003 (lecture) & 501.004 (lab) & 501.005 (lab)

Online Lecture: 5:00-5:50 PM Tuesday and Thursday

In Person Lab: 1:00- 6:00 PM Monday (section 501.004) or Friday (section 501.005)

### **Instructor**

Michael Kost, Associate Curator, Matthaei Botanical Gardens and Nichols Arboretum

Office: Matthaei Botanical Gardens

Email: [michkost@umich.edu](mailto:michkost@umich.edu)

Phone: 734-647-7704

Office Hours: Online Tuesday and Thursday, 6:00-7:00 PM following lecture or by appointment.

### **Graduate Student Instructor**

Chad Machinski, SEAS MS Student, Ecosystem Science and Management

Email: [chadmach@umich.edu](mailto:chadmach@umich.edu)

Virtual Office Hours: Tuesdays, 11 AM – 12 PM or by appointment.

Zoom Meeting: <https://umich.zoom.us/j/99675825495>

Meeting ID: 996 7582 5495

### **Course Objectives**

This course focuses on plant and natural community identification and ecological assessment. Students will learn to recognize the characteristic plants associated with a wide range of natural communities and become skilled in using botanical terminology and keys, recognizing plant family characters, and assessing ecological integrity.

### **COVID-19 Safety Guidelines and Considerations**

For the safety of all students, faculty, and staff on campus, it is important for each of us to be mindful of safety measures that have been required for our protection. As such, facial masks are required to be worn when indoors. By returning to campus, you have acknowledged your responsibility for protecting the collective health of our community. Your participation in this course on an in-person basis is conditional upon your adherence to all safety measures mandated by the State of Michigan and the University, including maintaining physical distancing of six feet from others, and properly wearing a face covering in class. Other applicable safety measures may be described in the [University's Face Covering Policy for COVID-19](#). Your ability to participate in this course in-person as well as your grade may be impacted by failure to comply with campus safety measures. Individuals seeking to request an accommodation related to the face covering requirement under the Americans with Disabilities Act should contact the [Office for Institutional Equity](#). If you are unable or unwilling to adhere to these safety measures while in a face-to-face class setting, you will be required to participate on a remote basis (if available) or to disenroll from the class. I also encourage you to review the [Statement of Students Rights and Responsibilities](#) and check-in with the Office of Academic Affairs Director to navigate support and resources for you.

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COVID-19 requires a flexible and dynamic response. Therefore, elements of the syllabus, assignments, and course structure may change based on potential public health developments. As an instructor, I will remain open to adapting course requirements to best support genuine student learning and physical and psychological health needs.

Course lectures will be audio/video recorded and made available to students in this course. As part of your participation in this course, you may be recorded. If you do not wish to be recorded, please contact me during the first week of class (or as soon as you enroll in the course, whichever is latest) to discuss alternative arrangements. Otherwise, you will be asked to consent to be recorded for the purpose of sharing the recording with your classmates.

Students are prohibited from recording/distributing any Class Activity without written permission from the instructor, except as necessary as part of approved accommodations for students with disabilities. Any approved recordings may only be used for the student's own private use.

### Additional Resources:

- [Maize and Blueprint](#). This website provides the latest updates about the University of Michigan and COVID-19.

**Recommended Texts** (helpful but not required as much of the information is available online).

- [A Field Guide to the Natural Communities of Michigan](#). 2014. J.G. Cohen, M.A. Kost, B.S. Slaughter, and D.A. Albert. Michigan State University Press. 362 p. Much of the information in this book is available online [here](#).
- [Field Manual of Michigan Flora](#). 2012. Edward G. Voss and Anton A. Reznicek. University of Michigan Press. 1008 p. Much of the information available online [here](#).

### Additional helpful resources:

- [Natural Communities of Michigan: Classification and Description](#). 2007. Kost, M.A., D.A. Albert, J.G. Cohen, B.S. Slaughter, R.K. Schillo, C.R. Weber, and K.A. Chapman. MNFI. 314 p.
- [The Vegetation of Wisconsin: An Ordination of Plant Communities](#). 1959. J.T. Curtis. Wisconsin Press. 704 p.
- [Plant Systematics, 3rd Edition](#). 2019. M.G. Simpson. Academic Press. 774 p.
- [Guide to Flowering Plant Families](#). 1994. W.B. Zomlefer. University of North Carolina Press. 430 p.
- [Plant Identification Terminology: An Illustrated Glossary](#). 2001. J.G. Harris and M. Woolf Harris. Spring Lake Publishing. 216 p.

### Supplemental Material for Lecture and Lab

Supplementary reading materials and media (e.g., podcasts, videos, etc.) will be posted to the course UM Canvas website. See [lab supplies list on Canvas](#).

### Grades

Final grades will be calculated based on the cumulative points earned during the semester as outlined above. The four lecture exams will focus on the material covered since the previous exam. Likewise, lab quizzes will focus on recent lab material. The final lab exam will be

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cumulative, covering the full range of lab topics and botanical terminology taught throughout the semester. The Ecosystem Assessment Project is described in detail further below.

<b>Grade Components</b>	<b>Dates</b>	<b>Total Points</b>
Lecture Exams: Four exams, 100 points each	Sep. 21st Oct. 21st Nov. 18th Dec. 14th	100 100 100 100
Lab Assignments & Quizzes: Eleven in total, 10 points each, with the lowest score dropped	Weekly on Mondays or Fridays	100
Lab Exam: One comprehensive final lab exam, 100 points	Monday, Dec. 6th or Friday, Dec. 10th	100
Ecosystem Assessment Project: 100 points	Nov. 29th	100
<b>Total Points</b>		<b>700</b>

**Lectures**

The lectures will be held online synchronously and will be recorded and available for viewing later (asynchronously). Classes will be recorded for the purpose of allowing students who are ill or in quarantine to continue with the course. Students may be heard on the recordings. The recordings will be available on the Canvas site only to students enrolled for the course. Do not share any part of any recording with anyone outside of the class – to do so will be considered academic misconduct and could have serious consequences. Ideally, students would be present online during the normally scheduled lecture periods to allow for an exchange of ideas, but attendance during the synchronous lectures is not strictly required since the material will be available for viewing asynchronously.

**Labs**

Labs will be held in person. Students will need to be prepared for conducting field work in natural areas, including wetlands. Most labs will be held at Matthaei Botanical Gardens (MBG), but will be visiting several other nearby sites, including at least one lab at Nichols Arboretum. Transportation via busses or vans will be provided to MBG and other sites, except Nichols Arboretum, which is on Main Campus near the hospital.

**Ecosystem Assessment Project (100 total points). Due November 29<sup>th</sup>.**

Pick a natural area and conduct an ecological assessment describing the vegetation, soils, natural and anthropocentric disturbances, and suggested natural areas management needs. Write a concise ecological characterization of the site and include a maps and plant species list with the estimated abundance/distribution of each species observed. Create an iNaturalist Collection Project for your site (instructions included in Canvas). Use iNaturalist to photo

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document at least 50 plant species or more prior to the first frost (usually early October). Please note that the emphasis of this report is meant to be on the ecology of the site and not on the natural area management suggestions. Include the following components in your site description:

1. Type(s) of natural community.
2. Size (acres and hectares).
3. Landscape Context. Describe the site's landscape context as can be observed through aerial imagery (e.g., The site occurs as an island of green space surrounded by extensive urban development; the site occurs within a matrix of rural agricultural lands and is bordered by a small (40 acre) woodlot and agricultural fields, etc).
4. Glacial Landform. If working in Michigan, describe the site's surficial geology (e.g., landforms) as mapped by W. R. Farrand & D. L. Bell (1982) in their [Quaternary Geology of Michigan](#) (e.g., outwash plain; medium textured ground moraine; coarse-textured end moraine, etc.). Provide additional details about the specific geological setting if you can deduce additional relevant contextual information (e.g., "occupying a narrow outwash channel within a broader coarse-texture end moraine" etc.). Include a surficial (Quaternary) geology map of your site illustrating the surrounding landforms.
5. Soils. Describe the soil texture (e.g., sandy clay loam), color, and pH (if possible). If your site is on organic soils, describe the level of decomposition as sapric, hemic, or fibric.
6. Community Structure. Describe the community structure and list the dominant or abundant plant species for each vegetative layer.
7. Plant List. Include a list of plants you observed and an estimate of their abundance/distribution.
8. Disturbance. Describe the signs of natural and anthropogenic disturbances observed.
9. Animal Signs/Sightings. List any incidental animal species or animal signs observed (e.g., deer browse noted on multiple woody saplings).
10. Management Recommendations. Describe the natural areas management needs.
11. Maps. Delineate the site you surveyed on the following GIS layers and include a map of each layer showing the site location. Note that you can use ArcGIS online to quickly map the site outline over these publicly accessible data layers.
  - a. Aerial image
  - b. *Circa* 1800s Vegetation of Michigan (Comer et. al, 1995)
  - c. Quaternary Geology of Michigan (Farrand and Bell, 1982)
12. Drawing. Include a cross-section sketch of the natural community you surveyed.
13. If your site is in Michigan, describe the vegetation *circa* 1800s for your site. Include a map of the [vegetation circa 1800s](#) of the surrounding area.

**Report Format for each site of Ecosystem Assessment Project**

Abstract: A short (one paragraph) and concise summary of your site. If the reader had only a few minutes to read your report, what would you want them to know?

Introduction: Describe the purpose of your assessment and site background. Example: "An ecological assessment was conducted of the oak-hickory forest at Huron Meadows Metropark in southern Livingston County to assess current conditions and provide useful information for guiding future natural area conservation and management efforts." Also describe the general background of the site as can be determined such as current landowner and their goals for the

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site. etc. Example: “The site is currently owned by Washtenaw County and is managed for recreation and biodiversity conservation as part of their Natural Areas Preservation Program.”

Methods: Describe survey methods. Describe what was measured or recorded. Describe how it was measured or recorded. Example: “A meander survey was conducted on these dates to assess...”. “Aerial photographs and maps of surficial geology (Farrand and Bell, 1982) and circa 1800s vegetation (Comer et al., 1995) were studied to assess landscape context and site history.”

Results: Describe the site addressing each of the components listed above (i.e., 1-13).

Discussion: Describe the ecological significance of the site, its management needs, and suggestions for future surveys to help guide protection and management (e.g., “Surveys for these rare species are needed to determine an appropriate burn window”, etc.).

Literature Cited: List at least five references from the scientific literature. Cite references using a standard (i.e., proper) scientific style. Example:

Kost, M.A. and D. De Steven. 2000. Plant Community Responses to Prescribed Burning in Wisconsin Sedge Meadows. *Natural Areas Journal* 20:36-45.

**Lecture Schedule**

<b>Wee k</b>	<b>Day</b>	<b>DATE</b>	<b>Topic</b>	<b>Point s</b>
1	Tue	8/31/21	Course Overview; Biological Hierarchy	
1	Thu	9/2/21	Biological Hierarchy & Naming	
2	Tue	9/7/21	Plant Morphology: Leaves, Surface Features, Stems, Roots	
2	Thu	9/9/21	Plant Morphology: Leaves, Surface Features, Stems, Roots	
3	Tue	9/14/21	Plant Morphology: Inflorescences, flowers, and fruit	
3	Thu	9/16/21	Plant Morphology: Inflorescences, flowers, and fruit	
4	Tue	9/21/21	<b>Exam</b> : Biological Hierarchy, Naming, Plant Morphology	100
4	Thu	9/23/21	Intro to Natural Communities: Climate; Geology; Soils; Landscape Position; Natural Processes	
5	Tue	9/28/21	Intro to Natural Communities: Climate; Geology; Soils; Landscape Position; Natural Processes	
5	Thu	9/30/21	Upland: Prairie	
6	Tue	10/5/21	Upland: Savanna - Oak Openings & Oak Barrens	
6	Thu	10/7/21	Upland: Savanna - Oak-pine Barrens and Pine Barrens	
7	Tue	10/12/21	Upland: Forest - Oak Forests: Dry & Dry-mesic Forests	
7	Thu	10/14/21	Upland: Forest - Northern Hardwoods: Mesic Forests	
8	Tue	10/19/21	<b>NO CLASS - Fall Study Break</b>	
8	Thu	10/21/21	<b>Exam</b> : Upland Natural Communities & Species	100
9	Tue	10/26/21	Wetlands: Marshes & Wet Meadows	

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9	Thu	10/28/21	Wetlands: Wet Prairies	
10	Tue	11/2/21	Wetlands: Fens	
10	Thu	11/4/21	Wetlands: Bogs	
11	Tue	11/9/21	Wetlands: Forests - Conifer Swamps	
11	Thu	11/11/21	Wetlands: Forests - Hardwood Swamps	
12	Tue	11/16/21	Wetlands: Shrub Swamps	
12	Thu	11/18/21	<b>Exam:</b> Wetlands Natural Communities and Species	100
13	Tue	11/23/21	Primary Communities: Wooded Dune & Swale Complex	
13	Thu	11/25/21	<b>NO CLASS - Thanksgiving Break</b>	
14	Tue	11/30/21	Primary: Open Dunes, Beach, & Cobble Shore	
14	Thu	12/2/21	Primary: Bedrock Lakeshores, Glades, Cliffs, & Alvar	
15	Tue	12/7/20	Rare Plants	
16	Thu	12/9/21	Rare Plants and Land Conservation	
16	Tues	12/14/21 5 - 6 PM	<b>Final Exam:</b> Primary Communities and Species; Rare Plants and Land Conservation	100
<b>Lecture Total Points</b>				<b>400</b>

**Laboratory Schedule**

Week	Lab	Day	Date	Topic	Site	Exam/Quiz	Points
1	0	Monday	8/30/21	NO LAB		NO LAB	
1	0	Friday	9/3/21	NO LAB		NO LAB	
2	0	Monday	9/6/21	NO LAB		NO LAB	
2	1	Friday	9/10/21	Plant Identification and Ecosystem Assessment	Matthaei Botanical Gardens	Assignment	10
3	1	Monday	9/13/21	Plant Identification and Ecosystem Assessment	Matthaei Botanical Gardens	Assignment	10
3	2	Friday	9/17/21	Plant Identification and Ecosystem Assessment	Pinckney Recreation Area	Assignment/Quiz	10
4	2	Monday	9/20/21	Plant Identification	Pinckney	Assignment/Quiz	10

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				and Ecosystem Assessment	Recreation Area	z	
4	3	Friday	9/24/21	Plant Identification and Ecosystem Assessment	Radrick Fen	Assignment/Quiz	10
5	3	Monday	9/27/21	Plant Identification and Ecosystem Assessment	Radrick Fen	Assignment/Quiz	10
5	4	Friday	10/1/21	Plant Identification and Ecosystem Assessment	Nichols Arboretum	Assignment/Quiz	10
6	4	Monday	10/4/21	Plant Identification and Ecosystem Assessment	Nichols Arboretum	Assignment/Quiz	10
6	5	Friday	10/8/21	Plant Identification and Ecosystem Assessment	Horner Woods	Assignment/Quiz	10
7	5	Monday	10/11/21	Plant Identification and Ecosystem Assessment	Horner Woods	Assignment/Quiz	10
7	0	<b>Friday</b>	<b>10/15/21</b>	<b>NO LAB: Fall Study Break 10/18 &amp; 10/19</b>		<b>NO LAB</b>	
8	0	<b>Monday</b>	<b>10/18/21</b>	<b>NO LAB: Fall Study Break 10/18 &amp; 10/19</b>		<b>NO LAB</b>	
8	6	Friday	10/22/21	Floral Dissection and Floral Formulas. Plant Families: Ranunculaceae & Fabaceae	Matthaei Botanical Gardens	Assignment	10
9	6	Monday	10/25/21	Floral Dissection and Floral Formulas. Plant Families: Ranunculaceae & Fabaceae	Matthaei Botanical Gardens	Assignment	10
9	7	Friday	10/29/21	Floristic Quality Assessment. Plant Families:	Matthaei Botanical Gardens	Assignment	10

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				Rosaceae & Brassicaceae			
10	7	Monday	11/1/21	Floristic Quality Assessment. Plant Families: Rosaceae & Brassicaceae	Matthaei Botanical Gardens	Assignment	10
10	8	Friday	11/5/21	ArcGIS Online Map Production for Ecosystem Assessment Project. Plant Families: Ericaceae & Lamiaceae	Matthaei Botanical Gardens	Assignment	10
11	8	Monday	11/8/21	ArcGIS Online Map Production for Ecosystem Assessment Project. Plant Families: Ericaceae & Lamiaceae	Matthaei Botanical Gardens	Assignment	10
11	9	Friday	11/12/21	Herbarium Tour. Plant Families: Apiaceae & Asteraceae	Matthaei Botanical Gardens	Assignment	10
12	9	Monday	11/15/21	Herbarium Tour. Plant Families: Apiaceae & Asteraceae	Matthaei Botanical Gardens	Assignment	10
12	10	Friday	11/19/21	Plant Families: Orchidaceae & Poaceae	Matthaei Botanical Gardens	Assignment	10
13	10	Monday	11/22/21	Plant Families: Orchidaceae & Poaceae	Matthaei Botanical Gardens	Assignment	10
<b>13</b>	<b>Friday</b>	<b>11/26/21</b>	<b>NO LAB</b>			<b>NO LAB</b>	
14	11	Monday	11/29/21	Plant Families: Cyperaceae & Juncaceae	Matthaei Botanical Gardens	Assignment	10
14	11	Friday	12/3/21	Plant Families:	Matthaei Botanical	Assignment	10



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				Cyperaceae & Juncaceae	Gardens		
15	12	Monday	12/6/21	<b>Lab</b> <b>Comprehensive</b> <b>Final Exam:</b> Botanical Terminology and Plant Families <b>Ecosystem Assessment</b> <b>Presentations</b>	Matthaei Botanical Gardens	<b>Exam</b>	100
15	12	Friday	12/10/21	<b>Lab</b> <b>Comprehensive</b> <b>Final Exam:</b> Botanical Terminology and Plant Families <b>Ecosystem Assessment</b> <b>Presentations</b>	Matthaei Botanical Gardens	<b>Exam</b>	100
<b>Total Points</b>							<b>200</b>