

Field Naturalist
Undergraduate Course
Notes for adapting the course at other institutions.

*Below is an annotated version of the syllabus developed and used by Noah Charney, which was modeled after similar courses developed in the Field Naturalist Program (master's degree) at the University of Vermont, taught there by Alicia Daniel and others. The book *These Trees Tell a Story* is about this course.*

This course revolves around weekly field trips where students encounter ecological mysteries in the field and are tasked with unpacking the stories and the science behind them through direct observation. As Alicia Daniel explained it to me, this course is about opening students' eyes to basic patterns in nature, like the fact that different species of trees grow in different habitats. It seems obvious to seasoned ecologists, but is not something most students have thought about yet. The core tangible skill that students learn is tree ID (at least, when taught in forested landscapes), which they use as a tool to discover and explain the site mysteries.

The major investment in setting up this course is in finding the sites you will visit. They should each tell a story on their own, and they should speak to each other to tell a story across the semester. It took me one summer to find the sites, however, I had lived in the valley for 14 years and already knew a lot of stories about the landscape and had a lot of leads. Starting with surficial geologic maps and talking to local geologists is a good place to start to find some compelling patterns. Ideally, you can track down some local naturalist ecologists who have published journal articles based on local field work that capture small-scale spatial patterns in the landscape.

The way I set up the semester, following how UVM set their course up, was to start with the sites where bedrock drives the pattern, then move to glacially-driven patterns, then to those driven by more recent ecological phenomena (like flooding, beavers, etc...), to land-use history patterns and ending with recent management. Of course, at each site you'll want to weave in all of the different layers, but the goal is to have one dominant driving story to discover at each site. Along the way, feed the students lots of little naturalist skills like wild edibles and such.

When the class arrives at a site, give students time to discover the major visual pattern you want them to investigate. Once identified as a group, break them into abiotic and biotic subgroups to dig into the pattern. Give them time to observe, investigate, and work through theories. Lead them down wrong directions if you please. Eventually bring the group back together and have them talk through the stories. I always carry a small chalkboard (8"x10" or so) and colored chalk, which frequently is necessary to draw, for instance, a lake delta cross-section, the bedrock layers, the water table, etc.

*Often, there are a few key indicator species of trees or herbs that help identify the patterns to make sure the students focus on. Then having a good reference for them to discover what these species indicate is useful. In New England, a great resource is the section on indicator species in the back of Wessel's *Reading the Forested Landscape*.*

At many sites, I print out maps to give them either at the beginning or during the group discussion. They may be aerial images, historic aerial images, geologic maps or whatever is relevant depending on what

clues will help (or help confuse in a productive way) the students. On occasions, I would hand out a few snippets of writing, such as excerpts from journal articles on the effects of sphagnum and the rate peat accumulation, or newspaper clippings from the tornado.

In addition to the sites whose puzzles you solve each week, We have a couple related sites on campus that the students spend the semester unpacking for themselves in their group projects. The last day we sat out eating hot chili and cornbread at their project sites while the students told the stories.

One of the weaknesses of the course the way I laid it out here is the volume of assignments for students to keep track of each week. There are a lot of assignments which keep the course challenging and interesting for students, and each piece is manageable alone, but with so many moving parts, students needed a fair amount of help in keeping on top of things.

Course Overview

The majority of this class will be held outside. Each week we will visit a different field site and spend the day untangling the natural history of the landscape at that location. We will examine how plant and animal communities in our region are shaped by processes such as geology, hydrology, weather, fire, predation, and human land use. Students will be expected to learn skills in species identification and landscape interpretation. Class work will include a final group project as well as weekly assignments. We will meet in all weather conditions, and full participation and attendance at every class is mandatory. Students must be prepared to eat lunch in the field, must come with a sense of adventure, and must be eager to spend considerable time in forests and swamps. Students are expected to spend approximately 8 hours per week outside of class working on course assignments.

TEXTS [*For students to acquire – some that are out of print may be purchased before class used online and resold to students*]

- 1) A good simple field guide to the trees of the region, for instance, for most of New England, the *Forest Trees of Maine Centennial Edition* is great.
- 2) A local accessible guide to the natural communities in your region. For instance, *The Nature of Massachusetts* by Leahy, or *The Story of Vermont* by Klyza and Trombulak
- 3) A narrative of the local geology, for instance, for New England, *Written in Stone* by Raymo and Raymo.
- 4) One (or multiple) of the “landscape reading” narratives: *These Trees Tell a Story* by Charney, *Reading the Forested Landscape* by Wessels, *Reading the Landscape of America* by Watts.
- 5) Field Notebook - Rite in the Rain N° 351, 4 5/8” x 7” Tagboard Field Page Pattern

Rotating Field Guides [*For instructor to provide. The books were each numbered 1 through 11. Each week, we would stand in a circle, always in the same order, holding our field guides and everyone would pass to the left and get a new field guide to use for the sit-spot journal entries that week.*]:

1. Wildflowers [Newcomb]
2. Insect Tracks [Eiseman & Charney]
3. Lichens [Walewski]
4. Birds [Sibley]
5. Mushrooms [Audubon/Lincoff]
6. Insects [Kaufman/Eaton]
7. Mosses [McKnight et al.]
8. Winter Weeds [Brown]
9. Ferns [Peterson Series]
10. Mammal Tracks [Elbroch]
11. Forest Forensics [Wessels]

ONLINE RESOURCES: *[Depending on the patterns and processes students will discover, point them towards some locally-relevant mapping sites and other such information]*

- *Link to your state's GIS web servers, for instance, Maine's Beginning With Habitat maps,*
- *USGS National Map: <https://apps.nationalmap.gov/viewer/>*
- *Identify good historic maps online or printed copies, going back to the mid 1900s and mid 1800s if possible.*
- *An example naturalist blog, for instance, Charley Eiseman's <http://bugtracks.wordpress.com/>*

TAs

I had two TAs each semester I taught this course. The TAs were upper level students who had not previously taken the course, but were learning alongside the students with an elevated role in teaching. Their duties included:

Weekly During Class:

- *Facilitate groups (make sure everyone's engaged and tasks are divided up)*
- *Run bird vocalization lessons during van rides*
- *Lead roadside geology lessons during van rides*
- *Facilitate field evaluations (tree ID quizzes)*
- *Manage field guide exchange*

Weekly Outside of Class:

- *Manage Blog*
- *Manage Moodle/Brightspace*
- *Grade blog posts*
- *Grade reading responses*
- *Help answer project questions, or other questions*

POLICIES, ETC.

Lunch

Bring your lunch each day. We will get in the vans promptly at 10:30 and return by 5:30.

Absences and Arriving Late

Because we will be in the field all day, there is no tolerance for late arrivals. We will leave without you. Furthermore, because this is an entirely field-based course, missing a class is unacceptable. There are only 11 field trips, and if you miss 2, you will not be given an evaluation. If you miss 1 day, you will be required to get to the field site on your own. Some of the sites are a 45 minute drive plus a 20 minute walk through the woods, so this will not be an easy task.

Hazards*[Of course, evaluate your own local hazards, lyme disease was our big one]*

Deer ticks represent a serious hazard that everyone should be aware of. In this area, lyme disease is very prevalent, and deer ticks are the vector. When you are working in the field, the rule is that you must check yourself twice a day: once at night, once in the morning. A thorough, full-

body check with mirrors, etc... is essential. Deer ticks are very small, and you should be careful to remove the entire head of any embedded ticks. The general rule of thumb is that it takes 24-36 hours for a tick to transmit lyme disease, so if you check yourself twice a day, you should be safe. In addition, you should wear bug repellent containing Deet. Wearing light colored long pants tucked into your socks and a light colored long sleeved shirt helps in detecting ticks in the field, assuming you look down frequently. Also, you should just always remain aware of any sensations on the entirety of your skin, and if something feels like it's crawling, check it out.

Symptoms of lyme disease include a fever, a characteristic bull's eye rash, and stiff joints. However, these symptoms frequently do not occur, and many people develop lyme disease that goes untreated. If untreated for a long time, lyme disease causes very serious, irreversible, and debilitating neurological issues. Many doctors recommend annual screening for lyme antibodies for people in frequent contact with deer ticks. However, the tests for lyme disease are not straightforward, so your best defense is to be vigilant in the field.

As we will be in the field, we will encounter other common hazards such as open water, unstable terrain, harsh weather conditions, bees, poison ivy, poison sumac, hunters, broken branches, etc... Please wear closed-toed shoes, non-cotton long-sleeve clothes and bring extra layers. A piece of bright orange is not a bad idea either. Please inform me if you have any allergies that I should be aware of.

COURSE WORK

The goal of this course is to train you to observe nature, and to give you an immersive field experience identifying an array of natural features. A primary product of this course is your experience throughout it. Thus, there is no tolerance for absences and late assignments. You cannot wait until December to experience Fall. It is your job to prove that you are fully embracing this experience. Completion of online weekly assignments will be a key tool used to evaluate your performance. Any journal entries not reflected in online submissions on the due date will be assumed to have been hastily assembled in the last week of classes – and thus will not be accepted. You will be evaluated based upon the quality of your work listed below (not in order of importance).

- I. Group Project Work:**
 - a. Paper**
 - b. Presentation**
 - c. Ongoing Updates**

- II. Portfolio:**
 - a. Final Reflection**
 - b. Paper from Group Project**
 - c. Site Reviews (x5)**
 - d. Journal:**
 - i. Field Guide Entries**
 - ii. Sit Spot Responses**
 - iii. Site Notes**
 - iv. Final Project Notes**

- III. Weekly Online Submissions:**
 - a. Site Reviews (x5)**
 - b. Blog Post:**
 - i. Field Guide Observations**
 - ii. Final Project Activities**
 - iii. Sit Spot Observations**
 - iv. Response to Assigned Readings**

- IV. Final Field Evaluation**

- V. Participation During Class**

Homework hourly breakdown:

Site Reviews	2 hr every other week
Sit Spot and Writeup	1 hr every other week
Final Project Activities	2 hr/wk
Assigned Readings and Responses	2 hr/wk
Field Guide Observations	1.5 hr/wk
Read/Comment on Blog.....	0.5 hr/wk
Total.....	8.5 hr/wk

- I. **GROUP PROJECT** – On the first day of class, you will be assigned a field site on campus, in a group of 4-5 students. Within your group, you will be responsible for uncovering the full story of the site and all its inhabitants. Consider the “levels of inference for a field naturalist” on the bottom of p. 7 of this syllabus. Divide up the tasks in any way you see fit.
- a. **PAPER:** On Nov. 8, your group will submit a substantial, well-organized document containing: a section detailing the **contributions of each author** to the research and writing; a **map** or two showing the different parts of your site and its landscape context; **lists of species**, including the degree of dominance of each, whether it is an indicator or generalist; a **site narrative** describing the underlying story and how these data lead to your inferences; summary of any **conservation issues**, noting habitats/species of conservation concern and any recommendations. You will have the opportunity to revise this paper and resubmit it by the last day of classes.
 - b. **PRESENTATION** On the last day that we meet, your group will explain the site to us in the field. Each person should contribute equally.
 - c. **ONGOING UPDATES** You should be making progress throughout the semester. To see that you are, I will periodically ask for oral updates on what you have learned thus far. In addition, you must submit a weekly sentence on the class blog describing your progress.
- II. **COURSE PORTFOLIO** –At the end of the course, you must submit:
- a. **FINAL REFLECTION** (~2 pages, Due Dec 11). How have your views of the natural world changed during the semester?
 - b. **PAPER FROM GROUP PROJECT** (see I-a above)
 - c. **SITE REVIEWS** (Five of these; ~2 typed pages) Tell the story of the site we visited on one of the previous two week. This should include nitty gritty details of key *pieces*, as well as the bigger picture *patterns* and *processes* evident at the site. You must complete one of these every two weeks.
 - d. **BLOG ENTRIES** – Every time you post a blog entry, also put a copy of the text into a single ongoing Microsoft Word Document that you will submit with your portfolio at the end of the course. [*The blog format worked well when we did it 10 years ago, students interacted with each other’s posts and the TAs were able to track and grade student involvement on it. We had some really compelling and well assembled posts. But other formats or platforms could work well too.*]
 - e. **JOURNAL** – a **chronological** record of your activities in this course. This must be in a dedicated bound notebook (see **Required Text** below). You must bring this notebook to class each week, and you must turn it in at the end of the semester. A loose collection of papers or a series of entries out of order will not suffice.

- i. **Field Guide Entries (Weekly)** Each week you will be assigned a new field guide – use it! Find some things (minimum 2) and key them out to species (or as close as you can get), then draw them in your journal, describe where you found them, what the identifying features are, what the common and scientific names are, and write something about their natural history. This must be included in your journal, and a text synopsis must be submitted in your weekly blog entry. **REMEMBER TO BRING THE FIELD GUIDES BACK EACH WEEK!!!**
- ii. **Sit Spot Response (Every other week)** Sit or explore your sit spot for 20 minutes alone, ideally without your journal or any other distractions. After you return from your sit spot, write about your observations while you were there. This must be included in your journal, and some observations reflected in your weekly blog post.
- iii. **Site Review Notes (Weekly)** This should include any measurements or notes taken in the field during class.
- iv. **Final Project Notes (ongoing)** This should contain a record of your contribution to the final project. This should include: the dates that you visited the site, as well as your observations on those dates, the dates on which you conducted research, the nature of that research, and what you learned from that research.

III. ONLINE SUBMISSIONS -- Upload the assignments below prior to class. Original copies must also be contained in your journal, but weekly uploads ensures that you are doing the tasks when assigned. This is an ongoing experience spread out over the course of a changing season, so don't think that you can save them until the last week and do them all at once – you will not get credit for late assignments! The Blog Posts are meant to reflect the content of your physical journal (except for notes taken during class). The blog is a public space, so don't put private things here that you wouldn't want the world to see. You don't have to use your real name on the blog posts, but make sure we know what your username is, and let us know if you don't want any images of you posted online.

- a. **SITE REVIEWS** – (2-3 typed pages) One of these will be due every two weeks. You should choose to write up one of the sites visited during the preceding two weeks. See II-c above.
- b. **BLOG POST:** Please embed images in slideshows or galleries so they don't take up too much space! Also, please read other student posts, and comment when you have something to say.
 - i. **Field Guide Observations:** What did you see with your field guide? Key features? (2-3 sentences or a couple photographs/scanned drawings with descriptions).
 - ii. **Final Project Activities:** Briefly describe progress, insights, thoughts made this week relating to your project site (1-2 sentences or a couple photos with captions)
 - iii. **Sit Spot Observations:** Brief insights from your spot. (3-4 sentences, or a few photos with captions every other week)
 - iv. **Response to Assigned Readings:** Write a few sentences showing that you got it, or didn't. (3-5 sentences).

IV. FIELD EVALUATION (last day of class, and some sprinkled throughout the semester) You will be tested on your ability to identify tree species, and possibly a few other groups of biotic/abiotic species that we talk about during class.

V. **CLASS PARTICIPATION** Each week, when we arrive at a new site, the first task will be to identify the **pieces** present. To accomplish this, we will break into two groups:

Biotic Group will focus on Trees, Forbs, Shrubs, Animals

- Identify and record as many species as possible
- Write down how many total species are present (including unidentified)
- Which are the Dominant Species?
- Which are Indicator Species?
- Note presence of split trunks, DBH, approximate tree heights,
- Core the oldest tree, when appropriate
- What animals do you expect to live here?
- What patterns do you see in the vegetation?

Abiotic Group will focus on Topography, Rocks, Soils:

- Note the site Elevation, Slope, and Aspect
- Take a soil core, and note composition and structure
- Soil pH, Ca, Mg, moisture
- Composition and configuration of any Rocks
- Are there stone walls?

In your journal, you should draw a map of the field site, and record all your measurements/observations. After the groups finish working, we will reconvene for a group discussion.

LEVELS OF INFERENCE FOR A (TERRESTRIAL) FIELD NATURALIST:

	PIECES (what?)	PATTERNS (how?)	PROCESSES (why?)	VALUES (so what?)
Abiotic	Latitude/Longitude	Ages	Continental Drift	Spirituality
	Elevation		Faulting	
	Slope	Layers	Orogeny	Morality
	Aspect		Volcanism	Aesthetics
	Exposure	Gradient	Glaciation	
	Temperature		Flooding	Utility
	Water	Structure	Weathering	
	Rocks		Frost Heave	Conservation
	Soil Composition		Wind Storms	Preservation
	Nutrients	Communities	Fire	
Biotic	Trees		Logging	Regulations
	Shrubs		Farming	
	Forbs		Damming	
	Fungi		Disease	
	Lichens		Decay	
	Animals		Predation	
			Behavior	
		Evolution		

MAP

[Create a map that encompasses your field sites and put it in the syllabus. I used the site names and put it on a DEM (digital elevation model) background. Students could not tell from the syllabus which sites we would be going to each day, since the site names were not on the schedule. Linking the site names on the map with the field experience and the ecological/geological setting was part of the puzzle for them to solve.]

SCHEDULE

Sept 5

Course Overview/Expectations/Absences/ Motivation vs Workload [*Go around circle and ask students for the ecosystem they identify with most, their “nature identity”*]
Intro to Rocks/Minerals, Soils. [*Instructor brings in example rocks from all the field sites to be visited in the semester, and students arrange them in groups*]
Using tools: Field guides, soil cores, tree cores, soil meter, etc... [*Go out and practice using these things around campus*]
Blog setup
Visit Final Project Sites and Assign groups

Sept 12

Reading Due: [*assign as appropriate to field site visiting this week*]
Online Submissions Due:
Readings, Field Guide, Project Notes

Sept 19

Reading Due: [*assign as appropriate to field site visiting this week*]
Online Submissions Due:
Readings, Field Guide, Project Notes, and **Sit Spot Entries**

Sept 26

Reading Due: [*assign as appropriate to field site visiting this week*]
Online Submissions Due:
Readings, Field Guide, Project Notes, and **Site Review**

Oct 3

Reading Due: [*assign as appropriate to field site visiting this week*]
Online Submissions Due:
Readings, Field Guide, Project Notes, and **Sit Spot Entries**

Oct 10

Reading Due: [*assign as appropriate to field site visiting this week*]
Online Submissions Due:
Readings, Field Guide, Project Notes, and **Site Review**

Oct 17

Reading Due: [*assign as appropriate to field site visiting this week*]
Online Submissions Due:
Readings, Field Guide, Project Notes, and **Sit Spot Entries**

Oct 24

Reading Due: [*assign as appropriate to field site visiting this week*]
Online Submissions Due:
Readings, Field Guide, Project Notes, and **Site Review**

Oct 31

Reading Due: *[assign as appropriate to field site visiting this week]*

Online Submissions Due:

Readings, Field Guide, Project Notes, and **Sit Spot Entries**

Nov 7

Online Submissions Due:

Field Guide, Project Notes, and **Site Review**

GROUP PAPERS FIRST DRAFT DUE FRIDAY Nov 8

Nov 14

Reading Due: *[assign as appropriate to field site visiting this week]*

Online Submissions Due:

Readings, Field Guide, Project Notes, and **Sit Spot Entries**

Nov 21

Reading Due: *[assign as appropriate to field site visiting this week]*

Online Submissions Due:

Readings, Field Guide, Project Notes, and **Site Review**

Dec 5

Online Submissions Due:

Field Guide, and **Sit Spot Entries**

In Class: Group Presentations and Field Evaluation

Due Wed Dec 11: FINAL REFLECTION PAPER and FINAL GROUP PAPER