

VERMONT LAW SCHOOL

## Ecology: Principles and Applications at the Landscape Level

June 1 - 13, 2020

### Instructor

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### Teaching Assistant

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### Course Format

- Online Lectures - M, T, W, Th (9 AM - noon)
- Virtual Field Trips - T, Th (1 PM – 4 PM)
- Individual Explorations of Local Landscapes

### Course Description

Ecology is the study of organisms and their environments – and the interrelationships between the two. During this intensive two-week course, we'll study ecological principles and applications through an intensive, integrative investigation of the landscapes of the Southern Vermont Piedmont and the White River Watershed. Rather than relying primarily on textbook examples of ecological concepts, we'll use examples from the local landscape to explore the diversity of life and illustrate these concepts.

We'll take virtual field trips to a variety of field sites and learn an ecological approach to landscape assessment that stresses not only inventorying the biotic and physical components (pieces), but also examining how these pieces are distributed in the landscape (patterns) and what forces drive these patterns (processes). A strong emphasis will be placed on interpreting the history of how the landscapes we see today have unfolded through time – from their geological origins to the impacts of European settlement and over 200 years of land-use. We'll look to the future of the landscape by exploring strategies for maintaining and restoring the ecosystems and organisms native to the region.

Although we will be employing an online, distance-learning approach to interact with the course material and each other, we'll use Microsoft Teams on a daily basis to create a virtual classroom with synchronous presentations and discussions. In addition, we have created a course TWEN site to serve as a repository and portal for resources and assignments. We will also take advantage of the fact that we are residing in diverse

geographies by asking everyone to investigate a landscape nearby to where they live and individually apply knowledge and skills we are learning about in class.

The science of ecology will play a critical role in guiding our society as we face the increasing complex challenges of the 21<sup>st</sup> century. As Oswald Schmitz states in the introduction to our companion text, ecology helps us “appreciate the intricate ways that humans are connected to their environment and how their interaction can alter the sustainability of the very ecosystems on which they are a part and from which they derive vital services.” This course will provide aspiring environmental professionals with a solid introduction to the science behind biodiversity conservation, natural resource management, and other landscape-level issues in the context of increasing climate instability.

### Learning Objectives

By the end of the course, it is our hope that the students will:

- understand the influence of the physical environment on the biological components of the landscape;
- be able to identify basic features of soils, surficial geology, and bedrock geology; key out plants; and recognize common natural community types;
- be able to begin to decipher the imprint of human history and natural disturbance on the local landscape;
- recognize and apply essential ecological concepts, including natural selection, succession, biogeochemical cycling, energy flow, landscape connectivity, and biological diversity;
- be familiar with the scientific method and its applications;
- understand the importance of managing landscapes at the watershed scale;
- recognize the interconnectedness of landscape elements and the complexity of environmental issues; and
- understand the basic principles of ecological planning.

### Course Readings

Required Text: *Ecology and Ecosystem Conservation* (Schmitz 2007). 166 pages. (Available from the bookstore or in digital format).

Several other course readings will be available through TWEN.

### Assessment & Grading

- Final Exam (80%) – This online exam will take place at 9 AM on Saturday, June 13
- Weekend Assignment (15%) – due June 8 at 8 AM – details will be provided in class
- Homework Assignment (5%) – due June 10 at 8 AM

## Course Schedule

### ➤ **Module 1** - Introduction to Ecology and Landscape Analysis (June 1-2)

#### June 1

##### *Student Preparations:*

- *Ecology and Ecosystem Conservation*: Preface and Chapter 1
- *The Round River* by Aldo Leopold
  - Prepare a locator map and short description of a natural area near where you live using two PowerPoint slides

##### *Microsoft Teams Virtual Classroom:*

- Course Introduction
  - Students introduce themselves via home landscapes
  - Review Syllabus
- Ecology and Natural History
- Overview of Southern Vermont Piedmont Biophysical Region
- Landscape Analysis Frameworks
- Bedrock and Surficial Geology
- Focal Species

#### June 2

##### *Student Preparations:*

- *Ecology and Ecosystem Conservation*: Chapter 2
- *Wetland, Woodland, Wildland* – Parts 1 and 2 (focus on Southern Vermont Piedmont and Southern Green Mountains)
- Species in the Spotlight (Northern Red Oak & Eastern White Pine)

##### *Microsoft Teams Virtual Classroom:*

- Landforms
- Natural Community Concept
- Pattern Observation/Scientific Method
- Soils

⇒ **Virtual Field Trip** to Kent's Ledge

### ➤ **Module 2** - Biodiversity, Species Interactions, and Natural Communities (June 3-4)

#### June 3

##### *Student Preparations:*

- *Ecology and Ecosystem Conservation*: Chapter 3
- *Wetland, Woodland, Wildland* - Part 3 and Wetland Natural Communities (pp. 237-243)
- Focal Bird Species – *All About Birds* website (Cornell):
  - Chestnut-sided Warbler
  - Scarlet Tanager

- Pileated Woodpecker
- Bobolink

*Microsoft Teams Virtual Classroom:*

- Review Kent's Ledge
- Ecosystem Dynamics and Community Ecology
- Speciation and Natural Selection
- Climate and Biodiversity
- Wetland Ecology (Grace)

June 4

*Student Preparations:*

- *Ecology and Ecosystem Conservation*: Chapter 4
- Wetland, Woodland, Wildland - Wetland Natural Communities
- Species in the Spotlight (Eastern Hemlock and Quaking Aspen)

*Microsoft Teams Virtual Classroom:*

- Wetland Ecology
- Population and Carrying Capacity
- Weekend Assignment

⇒ **Virtual Field Trip** to Zebedee Wetland in Thetford

➤ **Weekend Assignment** (June 5-7)

- Carry out a series of ecological inventory activities at a local natural area, including pattern observation, focal species, and substrate analysis
- Report your findings in a short PowerPoint presentation

➤ **Module 3** - Landscape Change and Threats to Biodiversity (June 8-9)

Monday, June 8

*Student Preparations:*

- Complete weekend assignment
- *Ecology and Ecosystem Conservation*: Chapter 6-7
- What Did Vermont's Pre-settlement Forest Look Like? (Snyder 2003)
- The Myth of the Unchanging Forest (Lautzenheiser 2011)  
<http://www.massaudubon.org/sanctuary/features.php?id=81>

*Microsoft Teams Virtual Classroom:*

- Student Presentations of Weekend Assignment
- Landscape Change
- Disturbance regimes
- Succession
- Guest Lecture on Invasion Ecology - Tom Lautzenheiser, Mass Audubon

Tuesday, June 9

*Student Preparations:*

- *Ecology and Ecosystem Conservation*: Chapter 8
- Species in the Spotlight (Sugar Maple & American Beech)
- *Wetland, Wetland, Wildland* – pp. 247-249, 257-259

*Microsoft Teams Virtual Classroom:*

- Guest Lecture - Steve Libby, Vermont River Conservancy
- *Ready Or Not, Garlic Mustard Is Moving In* (Rodgers, Stinson, and Finzi 2008)
- Floodplain Ecology (Grace)
- River and Floodplain Forest Analysis
- Ecosystem Services
- Homework Assignment

⇒ **Virtual Field Trip** to Randolph Floodplain

➤ **Module 4** - Landscape Ecology, Conservation Science, and Ecological Planning (June 10-11)

June 10

*Student Preparations:*

- *Vermont Conservation Design: Maintaining and Enhancing an Ecologically Functional Landscape*
- *Ecology and Ecosystem Conservation*: Chapter 9

*Microsoft Teams Virtual Classroom:*

- Species interaction homework review
- Principles of Landscape Ecology
- Conservation Biology
- Ecological Planning
- New Zealand Case Study

June 11

*Student Preparations:*

- *Ecology and Ecosystem Conservation*: Chapter 10
- *Ecosystems and Their Services* – Millennium Ecosystem Assessment

*Microsoft Teams Virtual Classroom:*

- Vernal Pool Ecology (Grace)
- Forest Stewardship
- Climate Change

⇒ **Virtual Field Trip** to Marsh-Billings-Rockefeller NHP

➤ **Final Exam** (June 13)

- multiple choice about course content
- essay comparing the ecology of your local landscape to White River Watershed