

**FOREST ECOSYSTEM DYNAMICS  
FOR 385  
Syllabus**

**Professor:** Bill Keeton, Ph.D.  
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Office Hours: by appointment via email

**Meeting Time and Place:** MANN HALL - TRINITY Rm. 104. Tuesdays beginning at 11:30. Indoor seminar meetings will generally run to approximately 2:30 to 3:00 (feel free to bring your lunch). Outdoor field trips will run to 5:00 PM, unless otherwise scheduled (see below).

**Credits:** 3

**Required Readings:**

2-3 readings from peer-reviewed scientific journals are required each week in class. These will be made available on Blackboard.

**Course Description:**

Our understanding of forest ecosystems has changed dramatically in the last thirty years. The idea that ecosystems are self-regulating systems striving for “balance” and “stability” has been firmly challenged. Today we recognize that change itself is the driving force behind ecosystem organization. Change in response to natural disturbances, change in response to environmental variability, such as climate change --- these are the norm rather than the exception.

Conservationists and land managers have to deal directly with ever-changing and often unpredictable systems. They must manage processes of change and recovery directly while anticipating future change. Consequently, no graduate student should leave a program of study in ecology or forest management without a solid understanding of ecosystem dynamics. Why do ecosystems change over time? How do they change? What happens when they change? How might they change in the future? These are fundamental questions in ecological science.

This graduate seminar will address these questions and more. The course objective is to provide advanced students with core or foundational knowledge in ecosystem science, drawn directly from the literature. We will explore classic and more recent, widely-cited literature that has influenced the development of contemporary models. The class will take several field trips to locations representative of concepts discussed in the literature. Specific topics of discussion will include the following:

- systems theory
- successional ecology
- natural disturbance ecology
- productivity and energy flows
- landscape patch dynamics
- historic range of variability
- biodiversity and ecosystem functioning
- paleo-ecology

- past and future climate change
- forest carbon dynamics
- dynamic models of conservation and forest landscape management

### **Course Requirements**

Course requirements are 1) completion of assigned readings and weekly free writes; 2) active participation in class discussion based on readings and field tours; 3) attendance; and 4) research proposal.

Grading will be as follows:

- Attendance and participation: 30%
- Weekly writing assignments on readings: 30%
- Group research proposal: 30 %
- Group presentation: 10%

### **Attendance and participation:**

This is a graduate level course. Regular attendance and full participation in discussions is absolutely required and essential.

### **Weekly writing assignment:**

Each week students will be required to hand in a typed synthesis of the assigned readings. This should include about 1 paragraph per paper summarizing key points. It should also include 1-2 general questions each reader might have related to individual papers or the group of papers. I will randomly choose a selection of students to discuss their questions at each meeting.

### **Research proposal and presentations:**

Students will form groups of 3-4 individuals and will develop a research question and collect pilot data during our trip to the Adirondacks. Based on research questions developed on that trip, each group will write a research proposal (not to exceed 12 pages, double-spaced) following an appropriate scientific format (to be discussed in class). Each group will then give a 20 minute presentation of the proposal at our final meeting. Detailed instructions for these assignments will be handed out at a later date.

### **Course Schedule:**

<u>Date</u>	<u>Topic</u>
Aug. 30	Introduction
Sept. 6	Quaternary landscape ecology; Ecological scale; and Ecosystem organization: communities vs. assemblages and continuous vs. discontinuous variation; individualistic plant association concept
Sept. 13	Successional models; Systems theory

Sept. 20	Forest stand development; Stand dynamics; Biological legacies
Sept. 26	All day field trip to Marsh-Billings-Rockefeller National Historical Park, Woodstock, Vermont. Meet at 8:30 AM at Aiken loading lock. Return to campus no later than 5:30 PM. Bring lunch, rain gear, etc. Come prepared for hiking (about 4-6 miles) at a rapid pace.  Topic: Historical ecology, landscape change, long-term stand dynamics, silviculture basics
Sept. 27	Natural disturbance dynamics (stands and landscapes): fire ecology; insects and pathogens
Oct. 4	Natural disturbance dynamics (stands and landscapes): wind, ice, and floods  Field Trip: 11:30-5:00 Williams Woods, Charlotte, Vt; Charlotte Nature Preserve.
Oct. 11	Forest carbon dynamics
Oct 18	Preparation for field research project; Intro to project site.
Oct. 22-23	Overnight field trip to Adirondacks (Ampersand Mtn; Stay at Huntington Wildlife Forest) Depart Saturday 8:30 AM. Return Sunday by 7:00 PM  <ul style="list-style-type: none"> <li>- Group project research</li> <li>- Old-growth forest ecology</li> <li>- Gap dynamics</li> <li>- Riparian Ecology</li> <li>- Pattern and process in forest succession and structural development</li> </ul>
Oct. 25	Field Trip: Mount Mansfield, Vermont Forest Ecosystem Management Demonstration Project. 11:30-5:00 PM.
Nov. 1	Historic Range of Variability  Special assignment: Project proposal outlines due
Nov. 8	Biodiversity and ecosystem functioning  Special assignment: Outlines returned
Nov. 15	Forest ecosystem responses to climate change; vegetation change simulation modeling  Special assignment: Proposal outlines due
Nov. 22	Thanksgiving break

Nov. 29	Dynamic forest management and conservation models; Group project work (Q&A)
Dec. 1	Schedule group meeting with Bill
Dec. 6	Research Proposal Presentations