

Terrestrial Ecology - Biology 3762.03 – Syllabus (Summer)

Instructor: Rajesh Rajaselvam

Lectures: Monday through Sunday, 0905-1155, 1305-1555

Field research/Labs: One week (at **Harrison Lewis Centre**, Port Joli area, Southwestern NS).

Understanding the structure and function of terrestrial ecosystems is fundamental to their conservation and necessary for remediation of impacted environments. This class provides a conceptual framework for understanding the range of the world's terrestrial ecosystems and provides practical field experience with major terrestrial ecosystems in Nova Scotia. Topics include the coupling of above-ground plant primary production, biogeochemistry, and nutrient cycling; food webs; biodiversity; ecological succession; and the significance of landscapes.

Examples feature major groups of terrestrial organisms, plants, insects, vertebrates, fungi, lichens, and soil microorganisms. After 4 days on campus, students spend 8 days at the Harrison Lewis Centre near Port Joli, where they conduct a variety of hands-on exercises as a class and research projects in teams. On the final day students give team oral presentations of their research projects. Back on campus for the last 3 days, students finish individual research papers, participate in review sessions and take an exam.

Format: Field intensive

Prerequisites: BIOL 2060.03, BIOL 2003.03 and BIOL 2004.03, or BIOL 2002.03

Learning outcomes:

1. Examine the principles and theories on the relationships between terrestrial life (individual organisms, populations, communities, and ecosystems) and both biotic and abiotic factors in the environment
2. Study the soil profile and interactions between biological and chemical processes in the soil
3. Understand and evaluate the mechanisms involved in primary and secondary succession
4. Learn and explain how landscape characteristics and patterns influence species distribution
5. Apply a range of simple practical methods to study animal and plant biology in the field
6. Formulate ecological hypotheses, design and implement simple field research methods, and analyze field data using appropriate statistical techniques
7. Demonstrate the knowledge of standard methods of describing, studying and evaluating different terrestrial ecosystems
8. Communicate scientific findings and personal development orally and in writing

Evaluation of Student Performance

Assignment, Exam, or Presentation	Marks %
Oral Presentation of the field research (group presentation)	10
Field Report	30
Monograph (<i>A Plant/Animal species of NS</i>)	5
Field Book (<i>for observed/noted flora and fauna, physical conditions, own/interesting findings/recommendations related to the course</i>)	5
Lab/Field Quiz	10
Written Exam	40
Total	100

Grading Scale: The grading scale is the same as used in the Biology core classes at Dalhousie:

90-100 A+	70-74 B	53-55 C-
85-89 A	65-69 B-	50-52 D
80-84 A-	60-64 C+	<50 F
75-79 B+	56-59 C	

Tentative schedule for Terrestrial Ecology (3762.03) Summer

Activity
<p>Course Introduction I: Lectures Introduction to Ecology <i>Overview of Ecology</i> <i>The Scientific Method</i></p> <p>Life on Land: Terrestrial Biomes <i>Large-Scale Patterns of Climatic Variation</i> <i>Soil: The Foundation of Terrestrial Biomes</i> <i>Natural History and Geography of Biomes</i></p> <p>Course Introduction II: Field Work <i>Biomes of Canada</i> <i>Short Movie on Terrestrial Biomes</i></p>
<p>Species Interactions and Community Structure <i>Food Webs</i> <i>Competition/Competitive Asymmetries</i> <i>Conception models</i> <i>Keystone Species</i></p> <p>Biodiversity <i>The Value of Biodiversity (Discussion session)I</i></p>

Succession and Stability

Community Changes During Succession

Ecosystem Changes During Succession

Mechanisms of Succession

Community and Ecosystem Stability

Biodiversity

The Value of Biodiversity (Discussion session)II

-Interactive session

Primary Production and Energy Flow

Patterns of Terrestrial Primary Production

Biotic Influences, Trophic Levels

Brief description on Field Research I: Report Writing

Nutrient Cycling and Retention

Nutrient Cycles

Rates of Decomposition

Organisms and Nutrients

Disturbance and Nutrients

Short Movie

Landscape Ecology

Landscape Structure

Landscape Processes

Origins of Landscape Structure and Change

Exam Preview/Sample Questions

Written Exam

Prepare for field trip

Drive to Harrison Lewis Centre, unpack, lunch

Harrison Lewis Centre – Quick Tour

Field Research: General Over View

Brief description on Field Research II: How?

Sampling

Data collection

Data Analysis

Oral Presentation

Field Research: Briefing I A

Visit to Site I (Ecosystem I)

Laboratory Analysis

Field Research: Briefing I B

Visit to Site II (Ecosystem I)
Field Research: Briefing II Visit to Site I and II (Ecosystem II) Laboratory Analysis
Field Research: Briefing III Visit to Site I (Ecosystem III) Statistical Analysis/Discussion
Laboratory Analysis Field Report Preparation (Group/Sub-group) Camp-fire
Clean up and packing; lunch Departure to Dalhousie/Halifax
Rest day/No Classes
Oral Presentations Feedback: Time to view marked exams
Quiz Field Research Reports due Time to work on assignments
Deadline to submit Monograph and Field Book

Textbook: “Terrestrial Ecology (custom made)”- Available at Dal book store

Selected Chapters From;

1. *“Ecology: Concepts and Applications”, Second Canadian Edition by Molles and Cahill, 2011*
2. *“Ecology Laboratory Manual” by Vodopich, 2010*
Published by McGraw-Hill

Field report: Comparison/Evaluation of Three Different Ecosystems in Port Joli Area

Format: Abstract, Introduction, Research objective, Method/materials, Results, Conclusions and Discussions

- A *notebook* will be necessary for use in the field and field station to include notes on procedures, hypotheses, and findings. This will be an invaluable resource in writing field reports.
- *Computer use* will be necessary for this field oriented class including oral presentations and field reports. We will also rely on email for communication among students and between students and teaching staff (instructor and teaching assistant) via OWL. Field reports and presentations will require the use of Excel (spreadsheets/graphs), Word and Power-point.

Items needed for field and research experiments

1. Oven
2. Light-microscope
3. Microscope slides
4. Cover slips
5. Weighing scale
6. pH meter
7. Light intensity meter
8. Moisture meter
9. Clinometer
10. Soil nutrient test kit (N/P/K)
11. Soil tools (augur or shovel) and nutrient testing kits
12. Tape measure
13. Hand-lenses
14. Wire-mesh
15. Paper/Polythene bags (small and medium sizes)
16. Marker pens
17. Tags or labels
18. Field notebook
19. Pegs
20. Ropes
21. Outdoor thermometer and weather station
22. Binoculars
23. Field guide (any flora of NS identification book)
24. Digital camera

Items 1 - 5: Available at the field station

Items 6 - 21: Provided before the field trips

Item 22: Students can bring their own pairs (optional)

Items 23: Four different guides with colour pictures will be uploaded on the course website/OWL
(students can bring their own in addition to these)

Item 24: Students should bring their own (optional)

During field research: Items needed/recommended for students

1. Clipboard & notebook paper
2. Pens & pencils
3. Daypack or shoulder bag to carry your things
4. Sneakers/ hiking boots
5. Windproof jacket/rain jacket and pants
6. Sunscreen
7. Insect repellent
8. Sunglass
9. Hat and gloves

At the field station: Required personal items

1. Sleeping bag/blankets
2. Pillow/s
3. Water bottle
4. Alarm clock
5. Flashlight with extra batteries
6. Appropriate clothing for a week
7. Boots/Rain-boots
8. Swimsuit
9. Personal toiletries (tooth brush, tooth paste, soap, shampoo and a bath towel)
10. Prescription drugs
11. Basic snack food
12. Cash (for emergency purchases)
13. Portable audio device (optional)
14. Laptop (optional, your responsibility; satellite internet available)