

Winter Field Ecology (1 cr) 11:216:475
March 12-17, 2023

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Course Objectives:

- To provide the student a field ecology experience in the "North Country" during the winter.
- To investigate underlying physical and chemical processes that make up the winter environment
- To investigate the adaptations of plants and animals to cold climates

This 1 week 1 credit (Credit-NoCredit) course is held off-campus at the Adirondack Ecological Center in the Adirondack Mountains of upper New York State during the third week in March (Sunday-Friday March 12-17, 2023). During the field trip, activities will revolve around a series of field and class explorations in the winter environment investigating a variety of ecological questions/phenomena. This course requires a high level of physical exertion (i.e., hiking, snowshoeing) in sometimes extreme environmental conditions.

Course fees include transport, lodging and food (except for fast food on road to-from). Meals will include vegan-vegetarian options. Send R. Lathrop an email with any dietary restrictions (i.e. food allergies) and your preferences (i.e., vegan-vegetarian-whatever). We will stay in heated cabins/bathrooms with hot showers but there is the opportunity to camp out overnight.

1. Course Objectives:

- To provide the student a field ecology experience in the "North Country" during the winter.
- To investigate the special problems of plants and animals during the cold winter months.
- Provide a better picture of how plants and animals interact with their physical environment and with each other during the winter season.

2. Texts: Life in the Cold, Peter Marchand, 3rd ed, 1996

Optional: Winter: An Ecological Handbook (Halfpenny & Ozanne, 1989);
Stokes Guide to Nature in Winter (Stokes, 1979)

3. Course requirements/expectations:

Each student will be required to keep a **daily journal** that records readings/class/field notes, personal observations/reflections, sketches/photos and a listing of all plant/animal species observed including common and Latin names. You can draw, include photos,

plant samples. **The journal is your opportunity to record, synthesize and reflect what you have read, observed, learned and experienced.**

The journal should be organized within a hardbound or Rite-In-Rain journal and worked on during the 1 week field course. There will be free time periodically through the day and in the evenings for you to work on your journal. The journal will be handed in one week after the end of the course, evaluated and returned to you to keep as a record of the experience.

Each student will prepare (**prior to the field trip**) and lead a 15 minute discussion on one of the course topics (listed below; each student will be assigned two topics). Use whatever audiovisual props you can devise (no powerpoints) . Be creative. I have created a Google Doc where you can sign up for a topic.

<https://docs.google.com/document/d/1mb21y5a9n5HOaLyEBfG7VkX5-bFi-HjFS4YKEEEWPkE/edit?usp=sharing>

Winter Environment:

- 1- what makes winter winter? What's the SCREW factor?
- 2- energy transfer: How do objects gain and lose energy? Principles of energy loss and transfer.
- 3- water/ice physics: What's so special about H₂O? Why does cold water sink? Why does ice float?
- 4- the essence of snow: How do snowflakes form and change in the atmosphere? What factors determine why there are so many types?
- 5- Snowpack physics: Once snow falls to the ground it forms the snowpack. How does snowpack change over time? Why is snow a good insulator?
- 6- Snow and radiant energy: Why is snow white? How does snow/snowpack interact with sunlight? Night-time cooling?

Plant Adaptations

- 7- the freezing problem: How do plants tolerate sub-freezing temperatures?
- 8- the dessication problem: Is winter drought a problem for plants?
- 9- evergreen vs. deciduousness: Are there advantages to being an evergreen?

Animal adaptations

- 10- thermoregulation: physical and behavioral responses of warm-blooded critters. What's so great about fur? shivering?
- 11- adaptive significance of body shape/size/color: Is being big & white really better? Gloger's and Bergmann's Rules.
- 12- physiological responses of warm-blooded critters. Why are mitochondria so mighty? Temperature effects on biochemistry: Do I really want my fat unsaturated?
- 13- the cold-blooded gamble: Is it better to freeze or not? Freeze tolerance vs intolerance in inverts & herps.
- 14- life under the ice: What are the pros/cons of dormancy vs. activity?
- 15- Human physiological adaptations to cold

Sunday, March 12

AM **Meet at ENR parking lot at 8:00AM with your gear.** If you are late you must call me to let me know @ 908 229 1779.

5 hour Drive to AEC.

Lunch (on the road – bring cash)

PM Adirondack Interpretative Center (AIC) Orientation Hike/Snowshoe

Evening History of AEC and Huntington Wild Forest: Jacob O’Connell (AIC) (7:30pm)

Monday, March 13

AM Presentations on Winter Environment:

- what is winter? What’s the SCREW factor?
- energy transfer: How do objects gain and lose energy?
- water/ice physics: what’s special about H₂O?

Class Exercise: constructing ice crystals and snowflakes

- essence of snow: how does it form? Why so many types?
- snowpack physics: How does snowpack change with time?
- snow and radiant energy: why is snow white?

Field Exercise: Snowpack environment- thermal profile observations

Lunch (at VIC)

PM

Tour VIC exhibits: Adirondacks Landscape & History
VIC Trails: Vegetation Communities & Winter Plant ID

Evening Night Hike/Star Find (meet at Director’s House)

Tuesday, March 14

AM Class Exercise - Predicting Ice thickness

- Trends in Ice-in & Ice-Out

Field Exercise: Water/Ice environment (on Rich Lake)

- Thermal profile observations

Lunch (at VIC)

PM

Presentations on Animals in Winter:

- thermoregulation: physical vs. behavioral responses of warm-blooded critters
- adaptive significance of body shape/size/color: Is being big & white really better?
- physiological responses of warm-blooded critters.

Field Exercise: Principles of Heat & Energy Transfer - hot potatoes

- the cold-blooded gamble: Is it better to freeze or not?
- life under the ice: What are the pros/cons of dormancy vs. activity?
- Human responses to the cold

Lodo Pond Snowshoe: Winter Habitat Utilization and Tracking

Construct Snow Shelter (if sufficient snow)

Evening Night Hike/Star Find (meet at Director's House)

Wednesday, March 15

AM Winter Travel Exercise: Foot-loading

- Presentations on Plants and Plant/Animal Interactions in Winter:
- the freezing problem: How do plants tolerate subfreezing temperatures?
 - the dessication problem: Is winter drought a problem for plants?
 - evergreen vs. deciduousness: Are there advantages to being evergreen?

Lunch (at VIC)

PM

Tour Arbutus Lodge and Snowshoe Arbutus Lake Old growth forest

Evening Presentation on Small Mammals of the Adirondacks: (VIC)
Set out traps (on snowshoe)

Thursday, March 16

AM Small mammal trapping

Climb Mount Goodnow. Adirondack Landscape Interpretation.

Lunch (in field)

PM Free time. Work on journals.

Evening Campfire (meet at Director's House)

Friday, March 17

AM Pack, Clean, Load up.

Lunch (on road, bring cash). Return to ENRS by 3-4pm.

Winter Ecology Field Trip March 12-17, 2023

We will be staying at the Adirondack Ecological Center (AEC) in Newcomb, New York. For AEC's web site go to: <http://www.esf.edu/aec/>. In an Emergency, the caretaker's phone number at AEC is (518) 582-4551. My cell phone (Rick Lathrop) is (908) 229-1779 (cell phone coverage is spotty at best up in the Adirondacks). My e-mail: lathrop@crssa.rutgers.edu. Contact me by cell if for whatever reason you can't attend the course.

Suggested Equipment List:

- Duffel bag to carry all this gear in
- Small backpack or large daypack for daytrips
- 3 season sleeping bag (bedding not provided) – 4 (0°) season if you want to camp
- Closed-cell pad – long pad to sleep outside, short pad for sitting/lounging
- Winter (insulated) boots – **very important**
- Winter parka (insulated)
- Snow/ski pants or shell
- Lighter weight jacket and/or vest
- Rain gear - top and bottom – or poncho
- Heavy pants (2 pr) - wool, pile or fiberfill insulated (recommended)
- Long underwear (2 pr) - top and bottom (polypro recommended)
- Extra top layers - Turtleneck, wool/pile sweaters
- Underwear - your choice
- Hat - preferably two, so one fits inside the other
- Earmuffs
- Neck gaiter or face mask or scarf
- Insulated mittens/gloves with windproof shell
- Lighter weight gloves
- Sunglasses
- Insulated/removable inner soles
- Gaiters (keep snow out of your boots)
- Insulated booties/slippers with sole - for in cabin use
- Thick outer socks - several pairs (1 for each day)
- Thinner inner socks - several pairs
- Several packs of handwarmers/footwarmers
- Flashlight or headlamp
- Survival/First Aid Kit: Compass, matches/pen knife/whistle
- Insulated mug
- 2 refillable water bottles
- Various and sundry toiletries, including towel
- Calculator
- Clipboard
- Journal (hardbound) – colored pencils, clear packing tape (optional)
- Optional
 - X-country skis, poles, boots
 - Binoculars
 - Camera

PERSONAL SAFETY

To be a safe winter traveler, one must carry adequate clothes and equipment, know how to prevent accidents, and be capable of dealing with any possible emergency. Many books are available on these subjects - check them out from the RU library, RU Outdoor Club collection or your local library. The following will mention some specific concerns for those hiking/snowshoeing.

Hypothermia

The most common mistake of winter hikers is to underestimate the severity of weather conditions, and to run the risk of hypothermia - the rapid chilling of the core body temperature due to wind and wetness. You want to stay dry as possible, both from rain/snow and sweat. Dress in layers, strip while hiking, add the layers back while resting. Rain is always a possibility so a waterproof outer shell, both top and bottom, is critical. Windchill is also a concern, especially on the summit or out on the lake, your waterproof shell can double as a wind shell to protect against the biting winter winds. In severe weather, everyone should stop and put on appropriate clothes, including rain/windproof jackets and pants and hats and mittens. Special caution should be displayed in crossing streams or out on the lake ice. They may appear sufficiently ice-covered and safe but beware (read Jack London's "To Build a Fire" if you question this advice). Do not go out on the lake alone or before we have gotten the "all clear" from the AEC.

Frostbite

Frostbite is an ever present concern in winter. Exposed areas (ears, nose, cheeks) and limbs (fingers, toes) are especially susceptible. Wear layered socks and mittens, but not too tight that circulation is restricted. Mittens are better than gloves. A pair of glove-liners is useful for handling skis, snowshoes in cold weather. You shouldn't touch metal with bare skin - it sticks. Remove water-soaked socks/mittens - always bring an extra pair. Avoid cotton, use wool or other wicking materials instead. Watch exposed areas, use a buddy system to look for grey, waxy skin. Warm with bare hand and breath but don't rub. For severe frostbit toes/fingers, warm slowly with warm water back at the cabin - DO NOT let refreeze at all costs. Thus only treat when back at a safe, warm location (preferably at the hospital).

Winter Travel

Never go out hiking any distance (> 1/8 mile) from camp alone. Travel in pairs and preferably in threes (1 person to stay with the injured, 1 person to go get help). Get prior approval from R. Lathrop or TA and leave a trip itinerary in the Director's House (persons on trip, trip objective, trails to be taken, mode of transport, time of departure, expected time of arrival). Always keep a large margin of caution - stay in control. Each person should carry water, extra clothing, hand warmers, cell phone.

Winter Ecology Field Trip January 12-17, 2023

Sign and email back to me this page. lathrop@crssa.rutgers.edu

I have read the above information on suggested equipment and personal safety. I understand that there are risks to life and limb associated with this trip and outdoor winter travel. I agree to behave in a safe and responsible fashion as there is the possibility of seriously injuring either myself or others.

In general, Rutgers University expects its members to demonstrate respect and regard for the rights, property and persons of all individuals; to take responsibility for their own actions; and to act to reduce risk of damage and harm.

Name

Date

Student ID#

email

Cell phone #

In Case of Emergency, contact the following person:

Name

Address

Phone