

Brief Descriptions of Black Rock Forest Curricula

Undergraduate and Continuing Education

These brief descriptions of curricula frequently pursued by undergraduate and continuing education students at Black Rock Forest are organized by subject area. Consortium members may obtain information and curriculum materials from Forest staff. Descriptions of curricula for other grade levels are also available on this web site.

Living Environment

Aquatic Invertebrates. A stream's status and ecological health can be quantified based on the types and relative abundance of aquatic invertebrates living in the stream zone. Students use several different sampling methods in different parts of streams to collect aquatic macroinvertebrate fauna. Then they use taxonomic keys and microscopes to identify organisms and construct numeric indices such as the EPT and Biotic Index. This information can be combined with water chemistry and physical measurements to provide a full stream assessment.

Biodiversity. Students compare the diversity of two different Forest plots, including species richness and the relative abundance of tree species.

Deer Biology and Management. The Black Rock Forest excels as deer habitat and as a location for deer population management. This class begins with a one-hour lecture at the Stone House. Pictures, animal skins, skulls, and antlers help explain the adaptations of deer and their critical behavior for survival. After a short break, students take a one-hour hike to explore the habitats and needs of white-tailed deer. Scheduled stops include visits to deciduous and conifer stands along neighboring swamps and wetlands. Techniques of tracking, with study of deer sign, are discussed and practiced, with an emphasis on the deer's annual breeding cycle. The class is best pursued in September, October and November. Winter classes are possible if weather permits.

Ecological Field Methods. This course provides hands-on instruction in common field methods used to assess ecosystem status and health, while familiarizing students with the flora and fauna of the local region. Students learn techniques for monitoring soil and water systems and plant, amphibian, and bird communities. These techniques are applied in a comparative study of forest plots in different stages of succession, all located in Black Rock Forest

Introduction to Forest Research. Black Rock Forest has been the site of various forest research projects since 1930. Some of the earliest experiments are still yielding results due to designs that included controls and replication. Using information from the Forest database, students can tour various "treatment" sites and quantify the long term results. Examination of more recent experimental areas demonstrates how the focus of research projects has changed over time.

Mammalogy Black Rock Forest provides an excellent field location in which to study adaptations and behavior of eastern deciduous forest mammals. Hand samples of a wide variety of mammal skulls, bones, and skins are available to examine in detail in the lab as well as pictures. Nearly two decades of deer population and associated biological data are available for analysis. Mammal tracks, scat and other signs can be studied in the field with Forest staff using equipment such as spotting scopes and remote infrared-trigger cameras.

Ornithology. Black Rock Forest has a complete Forest bird list, binoculars, field guides, and audio learning tapes to assist teachers and their students with this very popular field study. Peak times for study are spring warbler migrations, fall migrations, and winter bald eagle observation. Students can closely observe birds at feeding stations located at the Center for Science and Education and at the Stone House.

Tree Rings. Tree rings indicate the integrated growth response of trees to a full suite of ecological and environmental factors. Dendrochronology quantifies time: growth relationships of trees and forest stands and can be used to study past climates and other factors such as disturbance events. Students can examine tree rings from samples under microscopes to see the seasonal morphological changes that produce visual annual rings and can measure their width over a period of years using highly precise equipment. Once a chronology is established and rings are accurately dated, students can quantitatively explore climate-growth and other relationships.

Turtles. On a single day trip, students can learn how turtle research is accomplished in Black Rock Forest. Students examine various traps used in the ponds and the turtles (if any) taken from the traps. Students then check each turtle for recapture marks and tags, make measurements, and determine sex. In the classroom, students can view the turtle data that have been collected over the past several years and conduct studies using the population data.

Wetlands. Students learn that wetlands provide many benefits to humans and animals. They also learn the conditions that characterize a wetland. Students can document wetland plant species by observing species composition on a transect and then comparing it to that of adjacent uplands, and can view and discuss their adaptations. They can examine characteristics of wetland soils, including field capacity, organic matter content, and mottling. Characteristic wetland animals can also be studied.

Earth Science

Hydrology. The hydrologic cycle can be studied in detail in natural watersheds. Black Rock's weather stations provide accurate data on precipitation (P) inputs. Students can directly estimate stream discharge (D) from field measurements (flow, cross-sectional area), convert these to seasonal estimates, and compare them to the Forest's stream gauge records. Assuming a zero change in storage, actual annual evapotranspiration (ET) can be estimated as $P - D$. Classes can make field visits to examine the construction and operation of a stream gauge station and associated meteorological stations; online data sets are available for analysis. A dedicated 400-foot deep well can be used to study groundwater depth, chemistry, etc.

Orienteering. Combined use of map and compass can enable students to travel between exact locations on the landscape, navigating by taking bearings on prominent natural features and by using triangulation and other orienteering techniques. Specific courses can be established in the field to test students' ability to travel in this fashion over a set amount of time or in a timed competition.

Chemistry

Biogeochemistry. Weather conditions and human activities all around the world affect the environment. Biogeochemistry examines biological, geological, and chemical processes and their interactions and impacts on soils, water, and the atmosphere. At Black Rock Forest,

students are able to sample the soils, streams, and ponds to see the effects of acid rain and snow and the response of the Forest systems. Input-output budgets can be constructed for key biogeochemical cycles.

Math and Technology

Environmental Measurement. The Black Rock Forest Consortium has installed an environmental monitoring network in the Forest, consisting of a series of remote, automated environmental monitoring stations that measure weather conditions, soil and stream conditions, and other environmental parameters. Classes can tour these stations to learn how research-grade environmental data are collected. They can then access archived and real-time data from the network and explore them using a series of digital exercises.

Using the GPS. In this introductory class, students learn how to operate a GPS (Global Positioning System) unit. It is recommended that students who take this class also participate in the Orienteering course.

Green Building Tour. The Black Rock Forest Center for Science and Education and the Forest Lodge are called green buildings because they were built to have a more positive impact on the environment than traditional buildings. For example, the buildings are heated and cooled using only heat pumps connected to a well system, and our bathroom toilets are waterless, composting toilets that turn human waste into soil. The concepts behind a green building are intriguing to discuss and impressive to see in reality. For example, how best can a building take advantage of the sun's energy – heat and light? Tours allow students to see and learn about these features and the many other special considerations that went into the design and construction of these two special buildings.

Humanities: Language Arts

Creative Writing. Many of the landmarks of Black Rock Forest have inspired poems, legends, and historical short stories. Beautiful vistas, rock formations, waterfalls, and old homesteads supply the settings. All that is needed is imagination.