

# ECOLOGICAL CONCEPTS CURRICULUM NOLS/UNIVERSITY OF UTAH

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Biology on NOLS semesters is studied and applied on every section during three months of living and traveling in the wilderness. Local examples are used to study ecological concepts. The topographical and climatic diversity of the terrain in different sections helps students apply these concepts in different ecosystems. Students are graded on how they apply these principles to low impact camping, land management, risk management, and human impact.

A primary objective of the NOLS curriculum is to train individuals to be competent outdoors persons who can live and study comfortably in the wilderness while leaving minimal impact. With an emphasis on practical field studies and learning ecological principles, students develop an awareness and understanding of the natural sciences from both a theoretical and practical standpoint.

Specific classes and labs are offered in the following ecological areas, but staffs are expected to concentrate on areas that are germane to the locale of the expedition. Approximately three times as much time is spent in lab situations as in lectures. For example the ecological principle of human impact typically supports multiple lab sessions involving revitalizing soil that has been compressed by past campers, the direct removal of invasive species, and/or discussing whether to cook on fires and cause local impact or to use petroleum-burning stoves and cause a more displaced impact.

## ECOLOGICAL PRINCIPLES

- **Evolution:** Biodiversity, extinction, adaptations that maximize fitness, threatened and endangered species
- **Interaction:** biotic and abiotic factors, intersections in space and time, inter- and intraspecific competition, exploitation and symbiosis, communities
- **Population dynamics:** reproductive strategies, pop. growth rates, carrying capacity, threshold pop.
- **Trophic levels:** energy flow and nutrient cycling systems
  - Local examples
  - Web relationships- systems theory
  - Cascading effects
- **Change:** vegetative successions, fire ecology & climate change
- **Protected areas and the theory of Island Biogeography**
- **Humans:** the human niche, ecological footprint, climate change, over-harvesting, habitat loss, and introduction of non-native invasive species, local land management issues

## NATURAL SCIENCES:

- Trees and Shrubs: Identification and taxonomy
- Wildflowers: Identification, structure and function
- Edible Plants
- Plant Adaptation
- Animal Signs: Tracks, scat and other signs are covered.
- Mammalogy: Identification and regional variation
- Game Fish: Review of species, family relationship and identification
- Ornithology: Identification, special adaptations, migration and territoriality
- Geology: Rocks & minerals, rock types, geomorphology, plate tectonics & formations
- Glaciology
- Avalanche Science
- Oceanography
- Marine Biology
- Astronomy

- Weather

## FIELD STUDY METHODS

- GPS use & GIS format for documenting invasive or threatened species
- Reading topographic maps
- Invasive species removal techniques
- Ecological recovery of compacted soil sites

The 30–60 hours of Biology instruction (for 4 credit Biology courses) are based on matching the above list to the course terrain. The ecological principles are covered on every NOLS semester, but the natural sciences and field study methods listed are a menu that is adapted to both the specific course terrain and to local wildlife management needs. Staffs have the academic freedom to apply the ecological principles to the teachable moments of the expedition and to their own specific expertise.

The University of Utah believes the strength of the NOLS Biology curriculum is in the lab hours spent with staff, while applying this information to the immediate concerns of the expedition. This may include service-learning activities such as invasive species removal, soil rehabilitation, species location documentation, and other land management agency service projects.

We hope that this information is helpful. If you have further questions regarding the program, please contact the NOLS Admission Office at (800) 710-6657 between 8:00 and 5:00 Mountain Time.

### Course References:

- Brower, Michael. (1998). *The Consumer's Guide To Effective Environmental Choices*. Three Rivers.
- Carson, Rachel. (1998). *The Edge Of The Sea*. Mariner Books.
- Center For Outdoor Ethics. *Leave No Trace Outdoor Skills & Ethics* (series adapted to specific ecosystems)
- Cordell, HK, et al. (2005). *The Multiple Values Of Wilderness*. Venture Publishing.
- Dillard, Annie. (1974). *A Pilgrim at Tinker Creek*. Harper.
- Dillard, Annie. (1988). *Teaching A Stone To Talk*. Harper.
- Goodrich, Glenn, et al. (2006). *NOLS Wilderness Ethics: Valuing and Managing Wild Places*. Stackpole.
- \*\* Gookin, J. & Wells, D.. (2002). *Environmental Education Notebook*. NOLS. (teacher's guide)
- Greenlaw, Linda. *The Hungry Ocean*, Hyperion, 1999.
- Hampton & Cole. *Soft Paths*. 2003.
- Howley, Mary, M.S., R.D. (2002). *NOLS Nutrition Field Guide*. NOLS.
- Leopold, Aldo. (1966). *Sand County Almanac*. Oxford University Press.
- Lorbiecki, Marybeth. (1996). *Aldo Leopold: A Fierce Green Fire*. Falcon Pub.
- \*\* Lowenstein, J. (2007). *NOLS Ecological Concepts*. Lander, WY: NOLS.
- NOLS Staff. **Safari Guide** series: these booklets apply NOLS' ecological principles to 7 different ecosystems, helping students to observe indicator species and apply the ecological principles to real situations.
- Reisner, Marc. (1993). *Cadillac Desert: The American West and Its Disappearing Water* (2<sup>nd</sup> ed.) Penguin.
- Ryan, John. (1997). *Stuff: the secret lives of everyday things*.

\*\* These are the teacher and student guides for the NOLS semester ecology curriculum.