

# IOWA LAKESIDE LABORATORY

## Interinstitutional Program

Iowa Lakeside Laboratory is run cooperatively by the Iowa Lakeside Laboratory Consortium whose members include Drake University, Iowa State University, the University of Northern Iowa, and the University of Iowa. Lakeside courses can be taken for credit through all Consortium members. Students should check with their advisers to determine whether Lakeside courses can be used to satisfy major or minor requirements or college or university general education requirements.

The Laboratory was established in 1909 for the conservation and study of the rich flora and fauna of northwest Iowa, especially those of the Iowa Great Lakes region with its numerous lakes, wetlands, and prairies. Its campus is located on approximately 140 acres of restored prairie, wetland, and gallery forest along the west shore of West Okoboji Lake. Lakeside's mission is to provide undergraduate and graduate students an opportunity to get hands-on experience working with a variety of natural and human environments through its field-oriented summer courses and to provide research facilities and support for graduate students and faculty working on research projects in northwestern Iowa. Each summer, Iowa Lakeside Laboratory offers students a unique educational experience: small, full-immersion, field-oriented courses in the natural sciences (archaeology, ecology, environmental science, hydrology, evolution, geology, soils, taxonomy). All courses meet all day from Monday through Friday. The majority of courses run for 4 weeks. Enrollments in most courses are limited to 8 to 10 students.

Courses are taught at the undergraduate (sophomore and junior) and the senior/graduate level. Students obtain one credit for each week (40 hours) in class. One and two week courses are also available, including courses designed especially for teachers. Weather permitting, students normally spend at least part of each day doing field work, either as part of their class work or working on individual or group projects. Because some courses are offered intermittently, the current Iowa Lakeside Laboratory summer brochure or the Lakeside Lab Website ([www.lakesidelab.org](http://www.lakesidelab.org)) should be consulted for the list of courses being offered in a given summer session. The Lakeside Lab Website ([www.lakesidelab.org](http://www.lakesidelab.org)) also contains additional information about the Laboratory and about each course being offered.

Research projects by undergraduates, graduate students and faculty can be done either on the campus or at many nearby natural areas. Undergraduate and graduate students are strongly encouraged to do independent projects at Lakeside and graduate students are welcome to use it as a base for their thesis and dissertation research. Laboratory

space and other facilities are available for long-term or short-term research projects.

Teaching and research facilities include eight laboratory buildings, a library, and a lecture hall. Living accommodations include cottages, motel-style units, and a large mess hall. All students are encouraged to stay at Lakeside while they are taking courses to take full advantage of its educational, professional, and social life.

## Financial Aid

Iowa Lakeside Laboratory Scholarships are available to both undergraduates and graduate students. All scholarships cover room and board. Information about how to apply for Iowa Lakeside Laboratory Scholarships is included on the Website ([www.lakesidelab.org](http://www.lakesidelab.org) (<http://www.lakesidelab.org>)). Students should also consult the Student Financial Aid Office for other scholarship, work study, and loan programs for which they are eligible.

## Registration

Students can only enroll in Iowa Lakeside Lab courses by submitting an Iowa Lakeside Lab Registration and Scholarship form and Housing form to the Iowa Lakeside Laboratory Administrative Office. These forms are found on the Iowa Lakeside Laboratory Website: ([www.lakesidelab.org](http://www.lakesidelab.org)) (<http://www.lakesidelab.org>)).

Early registration is advisable. Because enrollment in Lakeside courses is limited, students should register before May 1 for the following summer session. Housing is also limited and students must apply for housing or indicate that they plan to live off campus at the time of registration.

### Courses primarily for undergraduates:

#### IA LL 293: Natural History Workshop

Cr. 1-2. SS.

Offered as demand warrants. Five-day-long, nontechnical introductions to a specific aspect of the natural history of the Upper Midwest or techniques for studying natural history.

#### IA LL 293G: Prairies

Cr. 1-2. SS.

Offered as demand warrants. Five-day-long, nontechnical introductions to a specific aspect of the natural history of the Upper Midwest or techniques for studying natural history.

#### IA LL 302: Plant-Animal Interactions

Cr. 4. Alt. SS., offered odd-numbered years.

*Prereq: One course in the biological sciences*

Introduction to ecology and co-evolution of plants and animals; emphasis on dispersal, pollination, and plant-herbivore interactions; field and laboratory work, reading, discussion.

**IA LL 303I: Undergraduate Internships**

(Cross-listed with NREM). Cr. 1-5. Repeatable. SS.

*Prereq: Permission of instructor and sophomore standing*

Placement with county conservation boards, camps, parks, etc. for experience as interpreters, rangers, and technicians.

**IA LL 312I: Ecology**

(Cross-listed with A ECL, ENSCI). Cr. 4. SS.

An introduction to the principles of ecology at the population, community and ecosystem level. Field studies of local lakes, wetlands and prairies are used to examine factors controlling distributions, interactions, and roles of plants and animals in native ecosystems.

**IA LL 326I: Ornithology**

(Cross-listed with A ECL). Cr. 2. SS.

The biology, ecology, and behavior of birds with emphasis on field studies of local avifauna. Group projects stress techniques of population analysis and methodology for population studies.

**IA LL 333: Animals and Their Ecosystems**

(4-0) Cr. 4.

*Prereq: Introductory biology*

Vertebrate and invertebrate animals of the Midwest are observed in nature either through passive observational techniques or active trapping exercises. Once identified, animals are placed in their proper taxonomic position (e.e., put onto the "Tree of Life"). They also are put into ecological perspective, including habitat preferences (i.e., wetland, lake, prairie, forest, river, edge), trophic position, and activity patterns. Conservation status is discussed.

**IA LL 364: Biology of Aquatic Plants**

Cr. 4. Alt. SS., offered even-numbered years.

A field-oriented introduction to the taxonomy and ecology of aquatic plants in lakes, wetlands and rivers. Individual or group projects.

**IA LL 367: Plant Taxonomy**

Cr. 4. SS.

Principles of classification and evolution of vascular plants; taxonomic tools and collection techniques; use of keys. Field and laboratory studies emphasizing identification of local flowering plants and recognition of major plant families.

**IA LL 371I: Introduction to Insect Ecology**

(Cross-listed with ENT). (3-3) Cr. 4. Alt. SS., offered odd-numbered years.

Field and laboratory study of insects, their diversity, life history; emphasis on ecology and behavior.

**IA LL 402I: Watershed Hydrology and Surficial Processes**

(Cross-listed with AGRON, ENSCI). Cr. 4. SS.

*Prereq: Four courses in physical or biological sciences or engineering*

Effects of geomorphology, soils, and land use on transport of water and materials (nutrients, contaminants) in watersheds. Fieldwork will emphasize investigations of the Iowa Great Lakes watershed.

**IA LL 403: Evolution**

Cr. 4. SS.

Mechanisms and patterns in microevolution and macroevolution. Field exercises will emphasize studies of natural selection, adaptation, genetic variation, and population genetics of local plant and animal populations.

**IA LL 404I: Behavioral Ecology**

(Cross-listed with A ECL). Cr. 4. Alt. SS., offered even-numbered years.

*Prereq: Two semesters of biology*

Animal coloniality, courtship, territoriality, predator defense, habitat selection, foraging, mating systems, and parental care will be examined in the field in order to evaluate various ecological and evolutionary theories of animal behavior.

**IA LL 408I: Aquatic Ecology**

(Dual-listed with IA LL 508I). Cr. 4. SS.

*Prereq: Courses in ecology, chemistry, and physics*

Analysis of aquatic ecosystems; emphasis on basic ecological principles; ecological theories tested in the field; identification of common plants and animals.

**IA LL 415: Freshwater Invertebrates**

Cr. 4. SS.

*Prereq: One or more ecology courses*

Field-oriented introduction to the identification, life-history, and ecology of common, free-living freshwater invertebrates of north-temperate lakes, rivers, and wetlands. Emphasis on the role of invertebrates in aquatic food chains and litter processing.

**IA LL 419I: Vertebrate Ecology and Evolution**

(Cross-listed with A ECL). Cr. 4. SS.

Field and laboratory study of representative vertebrates of northwestern Iowa. Observations and experimentation emphasize ecological histories by integrating concepts of functional morphology, behavioral ecology, and evolutionary biology.

**IA LL 420I: Amphibians and Reptiles**

(Cross-listed with A ECL). Cr. 2. Alt. SS., offered even-numbered years.

*Prereq: Two semesters of biology*

Ecology, behavior, and conservation biology of amphibians and reptiles with emphasis on their anatomy and morphology; temperature and water regulation; locomotion; life history; reproduction; population and community ecology; and conservation.

**IA LL 422I: Prairie Ecology**

(Cross-listed with ENSCI). Cr. 4. SS.

*Prereq: Familiarity with basic principles in biological sciences and ecology*

Basic patterns and underlying physical and biotic causes of both regional and local distributions of plants and animals of North American prairies; field and laboratory analyses and projects.

**IA LL 425I: Aquatic Toxicology and Wetland Dynamics in Freshwater Systems**

Cr. 2. SS.

*Prereq: Introductory biology course and general chemistry course*

Fundamental knowledge and understanding of the scientific concepts related to the physio-chemical and biological environment. Problems and issues (global, national, regional, and local) associated with freshwater systems and how wetland restoration can be used to ameliorate problems. Discussion and application of basic tools used to assess aquatic toxicological problems.

**IA LL 427I: Field Archaeology**

(Cross-listed with ANTHR). Cr. 4. SS.

Nature of cultural and environmental evidence in archaeology and how they are used to model past human behavior and land use; emphasis on Iowa prehistory; basic reconnaissance surveying and excavation techniques.

**IA LL 435I: Illustrating Nature I Sketching**

(Cross-listed with BPM I). Cr. 2. SS.

Sketching plants, animals and terrain. Visual communication, development of a personal style, and integration of typographic and visual elements on a page will be emphasized.

**IA LL 436I: Illustrating Nature II Photography**

(Cross-listed with BPM I). Cr. 2. SS.

Beginning to intermediate technical and compositional aspects of color photography of natural areas and their plants and animals.

**IA LL 450: Topics in Ecology and Sustainability**

(Dual-listed with IA LL 550). Cr. 1-4.

*Prereq: general biology course*

Scientific introduction to ecology and evolution of important groups of organisms: algae to vertebrates, different ecological phenomena (e.g., fire and climate change), varying landforms, different ecosystems (e.g., prairies and aquatic systems); emphasis on sustainability with introduction to concepts, issues, and practices; ability to communicate environmental information through a variety of means.

**IA LL 461I: Introduction to GIS**

(Cross-listed with ENSCI, ENV S, L A). Cr. 4. SS.

Descriptive and predictive GIS modeling techniques, spatial statistics, and map algebra. Application of GIS modeling techniques to environmental planning and resource management.

**IA LL 463I: Soil Formation and Landscape Relationships**

(Dual-listed with IA LL 563I). (Cross-listed with AGRON, ENSCI). Cr. 2. Alt. SS., offered even-numbered years.

*Prereq: AGRON 182 (or equivalent)*

Relationships between soil formation, geomorphology, and environment. Soil description, classification, geography, mapping, and interpretation for land use. Credit for only Agron 563 or 563I may be applied for graduation.

**IA LL 480I: Ecology and Systematics of Diatoms**

(Dual-listed with IA LL 580I). Cr. 4. SS.

Field and laboratory study of freshwater diatoms; techniques in collection, preparation, and identification of diatom samples; study of environmental factors affecting growth, distribution, taxonomic characters; project design and execution including construction of reference and voucher collections and data organization and analysis.

**IA LL 484: Plant Ecology**

Cr. 4. SS.

Principles of plant population, community, and ecosystem ecology illustrated through studies of native vegetation in local prairies, wetlands and forests. Group or individual projects.

**IA LL 490I: Iowa Lakeside Laboratory**

(Cross-listed with ANTHR, NREM). Cr. 1-6. Repeatable, maximum of 9 credits.

*Prereq: 8 credits in biology and permission of instructor*

Research opportunities for undergraduate students in the biological sciences. No more than 9 credits in Biol 490 may be counted toward graduation and of those, only 6 credits may be applied to the major.

**IA LL 493: Natural History Workshop**

Cr. 1-2. SS.

Offered as demand warrants. Five day-long, non-technical introductions to a specific aspect of the natural history of the Upper Midwest or techniques for studying natural history.

**IA LL 494: Ecosystems of North America**

Cr. 2-4. SS.

*Prereq: A general ecology course and permission of the instructor*

An extended field trip to study a particular type of ecosystem (prairie, coastal wetland, forest, alpine, coral reefs, etc.) or the ecosystems of a specific region (Rocky Mountains, Gulf Coast, Appalachian Mountains, Deserts of the Southwest, Central America, etc.). Prior to the field trip, there will be an orientation period and after each field trip a review and synthesis period. A field trip fee will be assessed to cover travel expenses.

**IA LL 499: Undergraduate Research**

Cr. 1-4. Repeatable.

*Prereq: Junior or senior classification and permission of instructor*

**Courses primarily for graduate students, open to qualified undergraduates:**

**IA LL 501: Freshwater Algae**

Cr. 4. SS.

Structure and taxonomy of freshwater algae based on field collected material; emphasis on genus-level identifications, habitats visited include lakes, fens, streams, and rivers; algal ecology.

**IA LL 503: Graduate Internships**

Cr. 1-5. SS.

*Prereq: Permission of instructor and graduate standing*

Placement with county conservation boards, camps, parks, schools, etc. for experience as interpreters, rangers, technicians, and teachers.

**IA LL 508I: Aquatic Ecology**

(Dual-listed with IA LL 408I). (Cross-listed with ENSCI, ENSCI, NREM, NREM). Cr. 4. SS.

*Prereq: Courses in ecology, chemistry, and physics*

Analysis of aquatic ecosystems; emphasis on basic ecological principles; ecological theories tested in the field; identification of common plants and animals.

**IA LL 523I: Fish Ecology**

(Cross-listed with A ECL). Cr. 2. Alt. SS., offered even-numbered years.

Basic principles of fish interaction with the biotic and abiotic environment. Field methods, taxonomy, and biology of fish with emphasis on the fish fauna of northwestern Iowa.

**IA LL 526I: Advanced Field Ornithology**

(Cross-listed with A ECL). Cr. 2. SS.

*Prereq: Concurrent registration in IA LL 326I*

Field study of birds of the upper Midwest; extended field trip to Minnesota and Wisconsin; individual or group project.

**IA LL 531I: Conservation Biology**

(Cross-listed with A ECL, EEOB). Cr. 4. Alt. SS., offered even-numbered years.

*Prereq: IA LL 312I*

Population- and community-level examination of factors influencing the viability of plant and animal populations from both demographic and genetic perspectives; assessment of biodiversity; design and management of preserves.

**IA LL 532: Analysis of Environmental Data**

(2-0) Cr. 2. SS.

*Prereq: An undergraduate course in statistics, understanding of basic concepts such as correlation and regression, and familiarity with PC-based software for data analysis*

Analysis of Environmental Data will provide students with training in the theory and application of a range of statistical techniques useful for the analysis of ecological and paleoecological data. Topics will include data management, exploratory data analysis, regression analysis, direct and indirect ordination methods, classification techniques, transfer functions and the analysis of temporal data. Practical classes will provide hands-on training in the use of statistical and graphical software including R, CANOCO, C2, and TWINSpan. The course will be directed towards advanced undergraduate, graduate and working professionals in ecology and paleoecology.

**IA LL 535I: Restoration Ecology**

(Cross-listed with A ECL, EEOB, ENSCI). Cr. 4. Alt. SS., offered even-numbered years.

*Prereq: A course in ecology*

Ecological principles for the restoration of native ecosystems; establishment (site preparation, selection of seed mixes, planting techniques) and management (fire, mowing, weed control) of native vegetation; evaluation of restorations. Emphasis on the restoration of prairie and wetland vegetation.

**IA LL 550: Topics in Ecology and Sustainability**

(Dual-listed with IA LL 450). Cr. 1-4.

*Prereq: general biology course*

Scientific introduction to ecology and evolution of important groups of organisms: algae to vertebrates, different ecological phenomena (e.g., fire and climate change), varying landforms, different ecosystems (e.g., prairies and aquatic systems); emphasis on sustainability with introduction to concepts, issues, and practices; ability to communicate environmental information through a variety of means.

**IA LL 563I: Soil Formation and Landscape Relationships**

(Dual-listed with IA LL 463I). (Cross-listed with AGRON, ENSCI). Cr. 2. Alt. SS., offered even-numbered years.

*Prereq: AGRON 182 (or equivalent)*

Relationships between soil formation, geomorphology, and environment. Soil description, classification, geography, mapping, and interpretation for land use. Credit for only Agron 563 or 563I may be applied for graduation.

**IA LL 564I: Wetland Ecology**

(Cross-listed with EEOB, ENSCI). Cr. 4. SS.

*Prereq: IA LL 312I*

Ecology, classification, creation, restoration, and management of wetlands. Field studies will examine the composition, structure and functions of local natural wetlands and restored prairie pothole wetlands. Individual or group projects.

**IA LL 573: Techniques for Biology Teaching**

(Cross-listed with A ECL, EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573A: Techniques for Biology Teaching : Animal Biology**

(Cross-listed with A ECL, EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573B: Techniques for Biology Teaching: Plant Biology**

(Cross-listed with EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573C: Techniques for Biology Teaching: Fungi and Lichens**

(Cross-listed with EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573D: Techniques for Biology Teaching: Aquatic Ecology**

(Cross-listed with EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573E: Techniques for Biology Teaching: Prairie Ecology**

(Cross-listed with EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573F: Techniques for Biology Teaching: Wetland Ecology**

(Cross-listed with EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573G: Techniques for Biology Teaching: Limnology**

(Cross-listed with A ECL, EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573H: Techniques for Biology Teaching: Animal Behavior**

(Cross-listed with EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573I: Techniques for Biology Teaching: Insect Ecology**

(Cross-listed with A ECL, EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573J: Techniques for Biology Teaching: Biology of Invertebrates**

(Cross-listed with EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573K: Techniques for Biology Teaching: Non-invasive Use of Living Organisms**

(Cross-listed with EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 573W: Techniques for Biology Teaching: Project WET**

(Cross-listed with A ECL, EEOB). Cr. 1-2. Repeatable. SS.

The development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips.

**IA LL 575I: Field Mycology**

(Cross-listed with EEOB). Cr. 4. Alt. SS., offered even-numbered years.

Identification and classification of the common fungi; techniques for identification, preservation, and culture practiced with members of the various fungi groups.

**IA LL 580I: Ecology and Systematics of Diatoms**

(Dual-listed with IA LL 480I). (Cross-listed with EEOB). Cr. 4. SS.

Field and laboratory study of freshwater diatoms; techniques in collection, preparation, and identification of diatom samples; study of environmental factors affecting growth, distribution, taxonomic characters; project design and execution including construction of reference and voucher collections and data organization and analysis.

**IA LL 590: Graduate Independent Study**

(Cross-listed with A ECL, ANTHR, EEOB). Cr. 1-4. Repeatable. SS.

*Prereq: Graduate classification and permission of instructor*

**IA LL 590I: Special Topics: Graduate Independent Study**

(Cross-listed with A ECL, ANTHR, EEOB). Cr. 1-4. Repeatable. SS.

*Prereq: Graduate classification and permission of instructor*

**IA LL 593: Natural History Workshop**

Cr. 1-3.

*Prereq: Permission of instructor*

Graduate workshop on some aspect of the natural history of the Upper Midwest or on techniques for studying natural history.

**Courses for graduate students:**

**IA LL 699I: Research**

(Cross-listed with A ECL, ANTHR, EEOB, GDCB). Cr. 1-4. Repeatable.