Course overview

**Ecosystems of Alaska** focuses on the application of ecological principles to field research. The course emphasizes the integration of ecology with climatology, geology, and culture to understand the functioning of ecosystems at local and regional scales. The major objective of this course is to introduce students to the concepts of ecosystem ecology and their application to the major ecosystems of Alaska through field research in these ecosystems. The field research is intended to provide students with the opportunity to design and conduct several interdisciplinary research projects and to analyze and interpret the results of this research. Following several days of lectures, library research, and research planning, we will spend two weeks doing field research in the major ecosystems of Alaska. At the end of the course, each student will present an oral and draft written report on the ecosystem on which she/he has specialized. The final written report is due within one month of the completion of the course. The course involves a full-time commitment for three weeks in late August and provides three undergraduate credits.

Format and logistics

The course requires full-time involvement of students from 8 am until 8 pm every day from Aug. 27, 2004. There are three major sections to the course.

I. **Introduction**: Three days of introductory lectures and field trips will familiarize students with principles of ecosystem ecology and provide general background about Alaska.

II. **Field research**: Two weeks of field research in selected Alaskan ecosystems. Half the time will be spent conducting student-led research projects. The other half of the time will be spent learning about other ecosystems from selected ecosystem experts. The class will be divided into 5 research teams. Each team is responsible for designing a research project to address a specific question that can be answered with one day’s field work. The student team responsible for an ecosystem will decide on the measurements to be made, using a research “toolbox” of techniques for which we have the necessary equipment. The team will make brief presentations to the rest of the class about their ecosystem, providing background information about that ecosystem and about the research that will be done. The team will then direct the rest of the class in collecting the essential data and will be responsible for analyzing and interpreting these data. Each student will be a member of one research team.

III. **Data analysis and final presentations**. For the last four days of the course, we will prepare and analyze samples and analyze the data statistically in preparation for a final symposium. At this symposium, each team will present the results of their research project to the rest of the class. Each student will prepare an individually written report in the form of a 3-5-page scientific paper or as a newspaper article that explains a scientific issue to the public. This paper is due October 1, 2004.

For further information
For additional information about the course see
http://www.faculty.uaf.edu/TChapin/Ecosystems.html or contact Terry Chapin
terry.chapin@uaf.edu
Phone 907-474-7922
Fax 907-474-6967

Registration forms and information about registration are available at
http://www.uaf.edu/reg/schedule/index.html
tel: 907-474-6300

Housing information is available from UAF Conference housing
conferenceservices@uaf.edu, http://www.uaf.edu/reslife/confgst.html
907-474-6768

Additional information is available from the Biology Department (Carol Piscer)
fnicap1@uaf.edu
907-474-6294

Registration and fees

Registration information is available at www.uaf.edu/reg/. Current University of Alaska (UAF) students can register after April 12. Non-UAF students can register after May 29. No student will be allowed to participate in field trips until they have registered for the course. To enroll in the course you must do the following:
1. Obtain permission of instructor
2. Register for the course and pay university fees
3. Pay transportation fees to the Department of Biology (upon arrival in Fairbanks)
4. Arrange your own housing (we recommend dormitories) in Fairbanks for the nights of Aug. 8-11; Aug. 16-19; Aug. 23-26, possibly Aug. 27, depending on departure date (total of 12-13 nights). Be sure to tell the housing office that you will be using a shared double room and that you are a registered student. To register for dormitory housing contact conferenceservices@uaf.edu.

The costs for the course are as follows:

Paid to the University of Alaska
Tuition (3 credits) $336
Technology fee $15

Paid to the Biology Department after arrival in Fairbanks
Transportation/laboratory fee $250

In addition, each student is responsible for the cost of their transportation to and from Fairbanks and for housing and meals during the time we are in Fairbanks. Dormitory fees are $16/person per night for a shared double room or $26.50 per night for a single room. Meals on the Fairbanks campus are about $15-25/day. We will share the cost of the food for the time we are camping (approximately $20 per person per day) equally among all students and instructors.
Tentative Schedule

Aug.  9  Introduction
      Course objectives and logistics 8:30
      Principles of ecosystem ecology 9:00
Geography and history of Alaska:
      Geology: David Stone 10:30
      Climate: Terry Chapin 11:00
      Paleoeocology: Terry Chapin 11:30
      Culture and human history: Mimi Chapin 1:00
Univ. of Alaska Arboretum: overview of Alaskan ecosystems
Organize research teams
Supper at Chapins
10   Lectures: Major ecosystem components
      Vegetation and production: Terry Chapin 8:30
      Decomposition and nutrient cycling
      Trophic dynamics: Knut Kielland: 10:30
      Vegetation distribution and succession: Terry 11:30
Research teams meet Terry
Visit UAF museum; Library research on projects
11   Class discussion: Dynamics and interactions in ecosystems
      Global change in climate and land use
      Vegetation-climate interactions
      Biogeochemical processes
      Landscape dynamics and fire: La’ona DeWilde
      Ecosystem change
Ecosystem teams meet to plan projects
12-14 Post-fire successional trajectory: Delta Junction (Melissa TEK)
15-16 Denali Highway and Denali Park
17   Analyze data
18   LTER disturbance dynamics
19   Tanana River research overview
20   Drive to Toolik
21   Overview of Toolik ecosystems and experiments
22   Tundra nitrogen cycling
23   Drive to Fairbanks
24   Sample analysis
25-26 Analyze data and prepare presentations
27   Symposium: Ecosystems of Alaska (Final presentations)
      Potluck at Chapins

*Days with student-led research

Grades

Letter grades will be given to all students, based on the following criteria:

Intellectual contribution to discussions                        25%
Active involvement in all phases of research                  25%
Quality of the research and final presentations of your teams 20%
Ecosystems and possible focal questions

*Delta Junction: Role of fire in the Alaskan boreal forest

Fire is the major disturbance in interior Alaska. Ecologists usually assume that vegetation will recover after fire and eventually return to the same type of vegetation that occurred before fire. However, Alaska is warmer than it used to be. Does vegetation that develops after fire return to the same state that was present before fire? How does productivity change after fire? How do the ecosystem services used by society change after fire?

*Nitrogen retention in tundra ecosystems

The productivity of most tundra ecosystems is strongly limited by N availability. Fifteen years ago I applied a stable (non-radioactive) isotope of nitrogen to tundra vegetation in northern Alaska. How effective are different tundra ecosystems in retaining the nitrogen that they receive. Who gets the nitrogen in the long term: plants, microbes, or undecomposable soil organic matter?

References
What conditions to expect:
Anything can happen. The challenge is to bring the minimum essential stuff for a range of conditions. This is easiest if you bring layers of clothes rather than big bulky jackets. It could be sunny and 70°F (20°C) or rainy and windy and 35°F (2°C). We will probably get some of both types of conditions. We will be sleeping in tents part of the time and inside most of the time. We will be traveling in cars with a minimum of storage space, so don't bring things you won't need.

What to bring:
Everyone should bring the following things:
  Comfortable field clothes (for example T-shirt, long-sleeve shirt, jeans, hat for sun, and boots)
  Things to keep dry: rain coat, rain pants, waterproof boots (preferably 14 inch rubber or neoprene boots). You should be prepared to work outside all day in the rain.
  Things to keep warm: Warm coat, sweater, windbreaker, warm hat, gloves, long underwear. You should be prepared to work outside in the cold all day.
  A set of extra field clothes if your clothes get wet
  Sleeping bag and sleeping mat
  Bug repellant, sun screen, sunglasses
  Camera and film
  Unbreakable coffee mug for warm drinks and picking blueberries
  Money: we will share the cost of food equally among all of us. I am guessing that this will be about $200 per person for the 3-week course. I would bring at least an additional $100, in case you see something else you want from the stores (film; replacement for lost clothes, meal in restaurant, etc.). I am assuming that each person will have paid their tuition prior to arrival. The transportation/lab fee will cover the costs of vehicles for the field trips and can be paid when you arrive. You cannot participate in any field trip until you have paid these fees, for insurance reasons.

Special needs:
Please tell me if you have special needs or concerns. For example, it would be useful for me to know if you have special dietary needs (allergies, vegetarian?), severe allergies (e.g., bee stings), etc. or if there are things we should know in planning the field work. Please bring any medicines you use regularly. We will supply a first aid kit for emergencies. There will be times when we will not see a store for 6 days.