

Methods in Population and Community Ecology – IB 170LF (3 units)

Website: IB 170LF *bCourses* site

Grading: 200 points total
Field exercises (5 @ 20 points each) – total of 100 points
Participation – 35 points
Independent research project – 50 points
Final oral presentation – 15 points

Note: there is no midterm or final exam for this course

Lab fee: A lab fee of \$110/student will be charged to help defray the cost of van rentals for the field trips.

Course Goals

This course is designed as a hands-on introduction to common research methods in population and community ecology. Students will learn how to quantitatively describe and statistically analyze patterns in (1) the distribution, abundance, and size/age distributions of populations, (2) the spatial distribution of individuals within a population, (3) interspecific association, (4) the diversity and similarity of multi-species assemblages, and (5) resource preference and selectivity. They will also be taught: (6) the fundamentals of experimental design and apply them in a field assessment of predation-risk.

Course Components

The course is comprised of a series of paired lectures and field exercises. Attendance will be taken at both, and together with active engagement in the exercise and related discussions, will serve as the basis for participation points. Students who are unable to attend a particular meeting must inform the instructors by e-mail **ahead of time** and provide a documented excuse for their absence.

Lectures: Lectures will introduce each of the methods covered in the course, with examples drawn from primary research literature. This background information will provide a foundation for the associated field exercises. Detailed instructions for analyzing and writing up the results of each study will also be presented.

Field exercises: The field exercises will give you hands-on experience with a variety of methods used in population and community ecology. At the same time, we hope to foster an appreciation for the natural history of the habitats where we will be working. There will be seven collaborative research exercises covering the course material. Each exercise will focus on the particular questions and methods discussed in the lecture that immediately preceded it. Since class time is limited and most labs involve travel to off-

campus field sites, promptness and focus are paramount. On field trip days, the class vans will leave the Enterprise Rent-A-Car parking lot by 1:15 – don't be late! If circumstances require that you drive your personal vehicle to the field site, the instructors should be notified of this prior to the field trip. Field trips may sometimes extend beyond 5 PM; you will be informed in advance whenever possible. All necessary field equipment will be provided, but it is important that you dress for the conditions (layered outerwear is strongly recommended) and bring water, snacks, etc. Wear hiking or rubber boots, or old tennis shoes (it is imperative that you keep your feet dry). Be prepared to get dirty, work hard, and have plenty of fun! Please inform the instructors of any health conditions (e.g. severe allergies to insect stings) that might be a safety concern.

Exercise write-ups: A write-up of methods and results will be required for five of the seven field exercises. Each write-up will be a collective effort produced by the group of students who worked together in the field. Group membership will be rotated for each exercise. All write-ups are due one week following the in-class analysis of data; a list of due dates will be posted. Data will be analyzed using a variety of computer programs, including spreadsheets, statistical packages, and other specialized software. The write-ups will follow standard scientific format (introduction, methods, results, discussion). They must be typed in 12-point font and not exceed 5 single-spaced, 8.5 x 11 pages, including figures, tables, and references. Long-winded rambling will not be rewarded, so be sure to outline what you need to say before you write and then do so as clearly and concisely as possible. All literature citations must follow the standard format of the journal *Ecology*. Collaboration between group members is strongly encouraged and additional help is always available from the instructors during office hours.

Although the labs will involve group work, which will be receive a collective grade, individuals who miss (**without prior permission**) a field exercise (or the lecture preceding it) can expect a lower grade than other group members, and will lose participation points.

Independent Research Project: Each class member will design and conduct an independent research project. We will guide you in formulating a research question that can be tackled in the time frame of the course, advise you on study design and methods, and provide equipment and supplies. You will write up your results in the format of a standard scientific paper and present them to the class in a mini-seminar at the end of the semester; detailed instructions will be provided later. In the eight week of the semester, we will ask you to submit a list of three potential research questions; these will be reviewed and discussed in individual meetings with the instructors to make a final selection. Once the project is underway, we will ask for periodic updates on your progress.

Readings: The required textbook, "How to Do Ecology" (see citation below) is an introduction to ecology as a scientific endeavor. It gives advice about how to develop a research question in ecology, design a study to investigate it, analyze results, communicate the study's findings, and pursue a career in the discipline. We will assign readings from this book and other sources as background for particular field exercises and your independent project.

Karban, R., M. Huntzinger, and I.A. Pearse. 2014. *How to Do Ecology*, 2nd ed., Princeton Univ. Press, Princeton, NJ.

IB 170LF Spring 2017
Schedule of Class Activities

Day	Date	Site	Topic
Tuesday	17-Jan	L	Introduction to the course and its instructors
Thursday	19-Jan	F	Richmond Field Station visit; developing a research question
Tuesday	24-Jan	L/C	Identifying your study organisms; data management in Excel
Thursday	26-Jan	L	Sampling methods and design; intro to hypothesis testing
Tuesday	31-Jan	F	Quantifying plant distributions across an invasion front in coastal prairie
Thursday	2-Feb	L/C	Data types and descriptive statistics; intro to JMP
Tuesday	7-Feb	L/C	Patterns of spatial dispersion and interspecific association; JMP training
Thursday	9-Feb	L	Basics of scientific paper format and writing; lab write-up instructions
Tuesday	14-Feb	F	Spatial patterns of herbaceous plants in coastal prairie
Thursday	16-Feb	C	Analyze plant dispersion and interspecific association data
Tuesday	21-Feb	L	Estimating the abundance of mobile organisms
Thursday	23-Feb	L	Assessing habitat or food choice (preference/selectivity)
Tuesday	28-Feb	F	Water strider populations: mark and release
Thursday	2-Mar	F	Water strider populations: recapture
Tuesday	7-Mar	L	Set up food choice experiment
Thursday	9-Mar	C	Analyze water strider mark-recapture data
Tuesday	14-Mar	L	Monitor food choice experiment
Thursday	16-Mar	L	Discuss independent research project ideas (3) with instructors
Tuesday	21-Mar	C	Analyzing food choice data
Thursday	23-Mar	L	Discuss hypotheses and methods of selected project with instructors
Tuesday	28-Mar		SPRING BREAK
Thursday	30-Mar		SPRING BREAK
Tuesday	4-Apr	L	Species diversity and assemblage similarity
Thursday	6-Apr	F	Install pitfall traps for ground-dwelling inverts in coastal prairie
Tuesday	11-Apr	L	Sort and count captured inverts
Thursday	13-Apr	C	Analyze species diversity and assemblage similarity of captured inverts
Tuesday	18-Apr	L	Elements of experimental design
Thursday	20-Apr	F	Set up predation experiment
Tuesday	25-Apr	F	Monitor predation experiment
Thursday	27-Apr	C	Analyze predation experiment data
Tuesday	2-May	L	Oral presentations of independent research results
Thursday	4-May	L	Oral presentations of independent research results

L = Lecture (3083 VLSB) C = Computer lab (3056 VLSB)

F = Field trip (on campus or meet at Enterprise Rent-A-Car, NW corner of Oxford & University)

Due dates for written assignments:

Lab write-ups are due by 1PM on the following days. An electronic version (preferably in MS Word) should be sent by e-mail to both the instructor and GSI. The final research paper is due by 5PM on the indicated date.

Tues, Feb 23: exercise 2 (spatial distributions and interspecific association)

Thurs, Mar 9: exercise 3 (mark-recapture)

Thurs, Apr 6: exercise 4 (species diversity/similarity)

Thurs, Apr 20: exercise 5 (food choice)

Thurs, May 4: exercise 6 (predation experiment)

Fri, May 12: final research paper

Penalties for late submission of assignments:

Five weekly exercises:

Submitted on due date, between 1PM and midnight: lose one point.

Submitted after midnight on due date: lose two points per day.

Final review paper:

Submitted on due date, between 5PM and midnight: lose two points.

Submitted after midnight on due date: lose 5 points per day.