

Biology 371, Spring 2015

Ecological Methods

Required Text: Adelman, J.S. 2015. Outline of Ecological Methods.

Supplemental Text: Braun, C. E. 2005. Techniques for wildlife investigations and management. The Wildlife Society, Bethesda, MD.

Prerequisites: The prerequisites for AEcl/Biol 371 are Biol 312 and Stat 101 or 104. I expect students enrolled in AEcl/Biol 371 have completed the prerequisites. Before attempting the course, students must have some basic knowledge of conservation issues, principles of ecology, and quantitative skills such as statistics and computing.

Course Objectives: Ecological Methods is a course that should appeal to students with a wide range of interests in applied ecology. AEcl/Biol 371 emphasizes integrating ecological ideas and observed data with project design and implementation and is a part of the sequence of courses that includes AEcl 451. The course is aimed at understanding the formulation of quantitative relationships from observations and developing analytical and presentation skills used to communicate results. I assume you have some knowledge about ecology and want to learn how to apply that knowledge to solve applied ecological and wildlife management problems. The course is not a typical techniques course that simply covers a long list of techniques of potential interest in natural resource management. Lecture and labs are integrated to progress through topics including statistical and mathematical concepts as they are applied to population and habitat ecology and management, exploitation and conservation biology, vegetation sampling, and analyses of landscapes, especially mapping and geographic information systems.

Outcomes: By the end of this course students should be able to...

- a. Select the proper statistical approach necessary to answer a specific ecological question
- b. Understand how ecological science is integrated into solving important management problems
- c. Apply current technology to collect and process information needed to reach defensible solutions to wildlife management problems
- d. Present your ideas clearly in technical communications format

Grading: Final grades will be determined based on the points listed below. Final grades are assigned according to a scale of 90-100 = A, 80-89 = B, etc.

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|---|-----|
| <u>Exams (dates on the lecture outline)</u> | |
| Exam 1 | 100 |
| Exam 2 | 100 |
| Final exam | 150 |
| Lab assignments/quizzes | 150 |
| TOTAL | 500 |

Although it is unlikely, it is possible that exam dates noted in the lecture outline could be changed slightly. Be sure to attend class for the latest information. Lecture exams will cover material from lectures and assigned readings up to and including dates announced in lecture. Lab quizzes may be unannounced. The instructor reserves the right to exempt students from taking the final exam if they are earning an A grade in the class.

Lab policies: students are evaluated on homework assignments and quizzes:

- Homework assignments are worth 20 points each and there will be five during the semester. Students will be informed of the due date and any special instructions as each assignment is given.
- Homework is due by the end of class on the due date. The TA can impose a 50% automatic late penalty and a 10% daily deduction for each additional day.

- Quizzes may or may not be announced, are worth 10 points each, and there will be five during the semester.
- I expect students to **read each lab** before meeting for that week. Introductory reading is fair game for quizzes.
- Participation is an integral part of the labs and is expected by all students. This includes participation in discussion, lab exercises, and overall quality of work and attitude during classes.
- Each student should own a flash (a.k.a. thumb) drive for saving data, homework, GIS projects, analyses, etc. (minimum of 1 GB capacity).
- If you have an internet connection at home, you can obtain ISU licensed software. We will use Microsoft Excel statistical software in this course.

Calculator and Cell Phone Policy: Calculators will be needed for class assignments, homework, and examinations. During examinations, no programmable or graphing calculators may be used. Penalty for such use is loss of all points on any exam question requiring calculations. Do not forget your calculator for exams because extra calculators will not be supplied. Cell phones must be turned off during class and examinations. Cell phones used during exams will be confiscated, along with the examination for which you will receive a zero score.

Academic Dishonesty: The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office.

<http://www.dso.iastate.edu/ja/academic/misconduct.html>

<http://www.dso.iastate.edu/ja/academic/students.html>

Disability Accommodation: Iowa State University complies with the Americans with Disabilities Act and Sect 504 of the Rehabilitation Act. If you have a disability and anticipate needing accommodations in this course, please contact the instructor to set up a meeting within the first two weeks of the semester or as soon as you become aware of your need. Before meeting with the instructor, you will need to obtain a SAAR form with recommendations for accommodations from the [Disability Resources Office](#), <http://www.dso.iastate.edu/dr/>, located in Room 1076 on the main floor of the Student Services Building. Their telephone number is 515-294-7220 or email disabilityresources@iastate.edu. Retroactive requests for accommodations will not be honored.

Dead Week: This class follows the Iowa State University Dead Week guidelines as outlined in

<http://catalog.iastate.edu/academiclife/gradingsystem/>

Harassment and Discrimination: Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, [Student Assistance](#) at 515-294-1020 or email dso-sas@iastate.edu, or the [Office of Equal Opportunity and Compliance](#) at 515-294-7612 or email eooffice@iastate.edu.

Religious Accommodation: If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. You or your instructor may also seek assistance from the [Dean of Students Office](#) or the [Office of Equal Opportunity and Compliance](#).

Contact Information: If you are experiencing, or have experienced, a problem with any of the above issues, email academicissues@iastate.edu.

Biology 371, Spring 2015

Lecture Schedule

| <u>Date</u> | <u>Topic and Background Material</u> |
|-------------|--|
| 12 Jan | Course introduction |
| 14 Jan | Sampling concepts, study design (Chapter 3) |
| 21 Jan | Statistical analyses (Chapter 4) |
| 26 Jan | Class exercise |
| 28 Jan | Defining a population and estimating population size (Chapter 5) |
| 2 Feb | Estimating population size (continued) |
| 4 Feb | Age and sex ratios (Chapter 12) |
| 9 Feb | Births, deaths, movements, and exponential growth models (Chapter 6) |
| 11 Feb | Population growth models--logistic (Chapter 6) |
| 16 Feb | Exam 1 |
| 18 Feb | Population growth --projection matrices/Age structure (Chapter 6) |
| 23 Feb | Class exercise |
| 25 Feb | Harvest management--sustained yield (Chapter 25) |
| 2 Mar | Regulating harvest |
| 4 Mar | Population viability analyses (Chapters 24 & 26) |
| 9 Mar | Occupancy estimation |
| 11 Mar | Occupancy estimation |
| 16-20 Mar | Spring Break, No Lecture or Lab |
| 23 Mar | Habitat evaluation, micro- and macro-scale (Chapter 18) |
| 25 Mar | Measuring frequency, density, biomass (Chapter 20) |
| 30 Mar | Class exercise |
| 1 Apr | Cover and visual obstruction (Chapter 20) |
| 6 Apr | Exam 2 |
| 8 Apr | Habitat use and preference (Chapter 18) |
| 13 Apr | Classification of wetlands and forests (Chapters 30 & 34) |
| 15 Apr | Agricultural landscapes and wildlife (Chapter 32) |
| 20 Apr | Land use reports, soil surveys/Urban wildlife |
| 22 Apr | Class exercise |
| 27 Apr | Community analyses |
| 29 Apr | Community analyses/Course wrap-up |
| 8 May | Final Exam , 9:45am-11:45am, Science II 202 |

Laboratory Outline

| <u>Week of</u> | <u>Topic and reading</u> |
|----------------|---|
| 12 Jan | 1. Statistics – estimating density from random and stratified samples |
| 19 Jan | 2. Data presentation/Graphing |
| 26 Jan | 3. Summary statistics |
| 2 Feb | 4. Statistical analyses |
| 9 Feb | 5. Estimating recruitment (Mayfield, age ratios) |
| 16 Feb | 6. Estimating mortality (aging animals, mortality rates) |
| 23 Feb | 7. Population estimation with mark-recapture and transects |
| 2 Mar | 8. Occupancy modeling in Program MARK |
| 9 Mar | Spring Break, No Lecture or Lab |
| 16-20 Mar | 9. Nest survival in Program MARK |
| 23 Mar | 10. Field tools – radio telemetry, distance sampling |
| 30 Mar | 11. Habitat mapping in the field with GPS |
| 6 Apr | 12. Community sampling and measurement (forests) |
| 13 Apr | 13. Community sampling and measurement (prairies) |
| 20 Apr | 14. Open lab |
| 27 Apr | 15. Presentations/Course evaluations |