

## Quantitative Ecology

Tu Th 1400-1520, Rogers 230

<b>Instructor</b>	Paul Murtaugh 66 Kidder 737-1985, murtaugh@stat.oregonstate.edu
<b>Office hours</b>	Tu Th 1530-1700, or by appointment
<b>Web site</b>	Course information and materials will be posted on Blackboard ( <a href="http://my.oregonstate.edu">http://my.oregonstate.edu</a> ), under ST_435_X001_W2006. You need to have an ONID account ( <a href="http://www.onid.orst.edu">http://www.onid.orst.edu</a> ) in order to use Blackboard.

### Objectives

To provide an overview of statistical methods that are useful for analyzing ecological data; to explore some special topics in ecology that have a strong quantitative or statistical bent; and to develop the ability to understand and evaluate the use of statistics in the ecological literature.

Following is a list of the specific topics to be covered. *A detailed schedule of lectures and assignments will be maintained on Blackboard.*

- Introduction and general principles
- Experimental vs. observational data
- Selection of predictors in multiple-variable modeling, and model validation
- Dependent data (serial correlation, mixed-effects models, spatial pattern analysis, smoothing and interpolation, pseudoreplication)
- Uses of Bayesian statistics and decision analysis in ecology
- Overview of computer-intensive methods

### Prerequisites

ST 412/512 (Methods of Data Analysis) or equivalent experience (two-way analysis of variance, multiple linear regression, etc.), including the ability to use a statistical computer package.

### Student responsibilities

There is no textbook. Lectures will be supplemented with readings from the literature. Most of the readings will be discussed in class.

There will be a variety of short homework assignments (some done individually, some in small groups). These will involve literature searches, calculations, data analysis, and questions about readings. Most of these assignments will be discussed in class, so they *must* be handed in on time!

Groups or group representatives will occasionally be asked to make oral presentations of their results to the class.

## Grading

80% of the grade will be based on the homework assignments, and 20% on class participation. Undergraduate students will automatically receive full marks for class participation — but they are still encouraged to participate!

At the end of the quarter, each student will be asked to evaluate the contributions of the other members of the group that he/she belongs to. These evaluations *may* influence the grades given to individual students.

## Some references (\* indicates the book is on reserve at Valley Library)

\* Burnham, K.P., and D.R. Anderson. 2002. *Model selection and multimodel inference : a practical information-theoretic approach*. Springer, New York.

Gelman, A., J.B. Carlin, H.S. Stern, and D.B. Rubin. 1995. *Bayesian data analysis*. Chapman and Hall, London.

\* Ludwig, J.A., and J.F. Reynolds. 1988. *Statistical ecology. A primer on methods and computing*. Wiley, New York.

\* Manly, B.F.J. 1998. *Randomization, bootstrap and Monte Carlo methods in biology*, 2nd Ed. Chapman and Hall, London.

\* Manly, B.F.J. 2001. *Statistics for environmental science and management*. Chapman and Hall/CRC.

Scheiner, S.M., and J. Gurevitch. 2001. *The design and analysis of ecological experiments*, 2nd ed. Chapman and Hall.

Venables, W.N., and B.D. Ripley. 2002. *Modern applied statistics with S*, 4th ed. Springer.

## Other resources

Included under *Course Documents* on Blackboard are (i) a list of ecological and statistical journals, and (ii) a long set of literature references, some of which will be referred to in class.