WILD 7150

ADVANCED ANALYSIS FOR ECOLOGICAL SCIENCES

ADV ANALYSIS FOR ECOLOGY

# Instructor

Dr. Todd D. Steury

Office: 2347 Forestry and Wildlife Building

Office Hours: by appointment or any time my door is open

Office Phone: 844-9253

E-mail – steury@auburn.edu

Course web page: <http://www.auburn.edu/~tds0009/wild7150.html>

# Pre-requisite

STAT 7000 or similar statistics course that covers single factor ANOVA and simple regression. If a student isn’t certain whether they are sufficiently prepared for the course, they should consider their proficiency in the following topics:

What I expect students to know at the START of WILD 7150

* What hypothesis testing is and why we use it.
* What a normal probability distribution is and why we use it in statistics
* What a p-value is and how it is used
* What a null hypothesis is and how it’s used
* What a regression is, what it’s used for, and how to do it (software doesn’t matter)
* What sum of squared error is and how it’s used
* What the total sum of squares and sum of squares due to regression are.
* How the slope and intercept in a regression are estimated
* What a confidence interval is and how it’s used
* What r2 and how it’s used
* What a t-test is, what it’s used for, and how to do it (software doesn’t matter)
* What an ANOVA is, what it’s used for, and how to do it (software doesn’t matter)

# Course Format

The course will consist of three 1-hour lectures, plus a single 2-hour lab, per week (for 4 total semester credits). Labs will be conducted in the computer lab, where students will gain hands-on experience in the use of the *R* statistical computing language

# Text

No one text covers all the techniques that we might want to cover, Thus, much of the material will be compiled from the relevant books and the primary literature (e.g., *Ecology, Journal of Wildlife Management, Conservation Biology, Frontiers in Ecology and the Environment, etc.*). However, I highly encourage you to purchase:

M. J. Crawley. 2012. The R Book. John Wiley & Sons, West Sussex, UK.

The book is an excellent resource into using R for statistical analysis, and will be helpful throughout the class and beyond.

# Course Description

WILD 7150 – Advanced training in the application of analytical procedures to ecological sciences, such as the analysis and modeling of survival, reproduction, habitat selection, population growth, density-dependence, and morphometrics. Course emphasizes model building and evaluation.

# Course Objectives

1. Familiarize the student with the application of advanced analytical procedures to topics commonly studied in ecological sciences, including, but not limited to: ANOVA, ANCOVA, general linear modeling, generalized linear modeling, random- and mixed-effects models, repeated measures and nested models, likelihood, principle components analysis, structural equations modeling, Akaike information criterion, multimodel inference, bootstrapping, and Bayesian statistics.
2. Familiarize the student with the different procedures that can be used in the analysis of various topics, and the strengths and weaknesses of each procedure.

1. Train the student how to perform advanced analytical procedures using the *R* statistical computing language *R*.

# Course Requirements/Evaluation

Students will be evaluated via weekly assignments, weekly quizzes, a mid-term exam, and a final exam. Assignments will include weekly reports started in lab that detail procedures learned and performed on example data. Assignments will count 50% of the total grade. The mid-term exam will count 15% of the total grade and will be a practical examination of students’ skills with the *R* statistical computing package. The final exam, which will be comprehensive, will consist of two parts: an applied practical exam of students’ skills with the *R* statistical computing package, and a written exam of students’ basic understanding of analytical methods. The final will count for 25% of the total grade, with each part of the final exam contributing the half the final exam grade. The remaining 10% of the total grade will come from weekly quizzes. Quizzes and exams will be short answer and multiple choice. The standard grading scale will be used (i.e., 90-100% = A; 80-90% = B; 70-80% = C; 60-70% = D; <60% = F).

# Course Policies

**Attendance**: Although attendance of lectures is not required, students are expected to attend lectures, and will be held responsible for any content covered in the event of an absence. Students should make every effort to attend lab. If students can not make lab for any reason, they should reach out to me, preferably in advance, to make arrangements to turn in the lab exercise.

**Excused Absences**: Students are granted excused absences from class for the following reasons: illness of the student or serious illness of a member of the student's immediate family, the death of a member of the student's immediate family, trips for student organizations sponsored by an academic unit, trips for university classes, trips for participation in intercollegiate athletic events, subpoena for a court appearance, and religious holidays. Students who wish to have an excused absence from class for any other reason must contact the instructor in advance of the absence to request permission. The instructor will weigh the merits of the request, and render a decision. When feasible, the student must notify the instructor prior to the occurrence of any excused absences, but in no case shall such notification occur more than one week after the absence. Appropriate documentation for all excused absences is required. Please consult the Student Policy eHandbook for more information on excused absences.

**Make-Up Policy**: Arrangement to make up a missed major examination (e.g.:hour exams, mid-term exams) due to properly authorized excused absences must be initiated by the student within one week of the end of the period of the excused absence(s). Except in unusual circumstances, such as the continued absence of the student or the advent of university holidays, a make-up exam will take place within two weeks of the date that the student initiates arrangements for it. Except in extraordinary circumstances, no make-up exams will be arranged during the last three days before the final exam period begins.

# Academic Honesty

All portions of the Auburn University student academic honesty code (Title XII) found in the Student Policy eHandbook will apply to university courses. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

# Justification for Graduate Courses

This is an advanced course, requiring a solid understanding of basic statistics procedures. The prerequisite for this course would be STAT 7000 or similar. Students will learn to model ecological systems at a level equal to that used in ecological literature. Thus, the difficulty of the topics combined with the depth with which students will learn to apply them will ensure that graduate level credit is warranted.

# Students with Disabilities

Students who need accommodations are asked to electronically submit their approved accommodations through AU Access and to arrange a meeting during office hours to discuss your accommodations. If you have a conflict with my office hours, an alternate time can be arranged. To set up this meeting, please contact me by e-mail. If you have not established accommodations through the Office of Accessibility, but need accommodations, make an appointment with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT)

# Lecture Outline

An up-to-date outline of lecture and lab topics, as well as the date they will be covered can be found on the course web-site.