Prefix and Number: WILD 7150
Initial Term: FALL 2009

Select One:
New x  Delete  Course Modification

Type of modification:
Title  Description  Credit hours
Prerequisites  Grade Type
Number: Old
New

Title: ADVANCED ANALYSIS FOR ECOLOGICAL SCIENCES
College/School: FORESTRY AND WILDLIFE SCIENCES
Dept: 

Abbreviated Title: ADV. ANALYSIS FOR ECOLOGY

<table>
<thead>
<tr>
<th>CREDIT OFFERED</th>
<th>CONTROLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levels: (select all that apply)</td>
<td>Grading Rule:</td>
</tr>
<tr>
<td>None (Blank)</td>
<td>Undergraduate (U)</td>
</tr>
<tr>
<td>Undergraduate (U)</td>
<td>Graduate (G)</td>
</tr>
<tr>
<td>x  Graduate (G)</td>
<td></td>
</tr>
<tr>
<td>Professional (P)</td>
<td></td>
</tr>
<tr>
<td>Maximum:  3</td>
<td>Grading Type: (select one)</td>
</tr>
<tr>
<td>Minimum:  3</td>
<td>x  Normal grading (Blank)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector: (select one)</td>
<td>Term Offered: (select one)</td>
</tr>
<tr>
<td>x  Fixed (F)</td>
<td>Not Specified (Blank)</td>
</tr>
<tr>
<td>Variable (V)</td>
<td>x  Fall Only (F)</td>
</tr>
<tr>
<td>Alternate (A)</td>
<td>Spring Only (S)</td>
</tr>
<tr>
<td>To be Arranged (T)</td>
<td>Summer Only (M)</td>
</tr>
<tr>
<td>Maximum Repeat:  3</td>
<td>Fall, Spring (FS)</td>
</tr>
<tr>
<td>(Total number of credit hours that may</td>
<td>Intersession (I)</td>
</tr>
<tr>
<td>be earned, not total number of times</td>
<td></td>
</tr>
<tr>
<td>course may be taken)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Session Duplicate:</td>
</tr>
<tr>
<td></td>
<td>yes  no  x</td>
</tr>
</tbody>
</table>

Prerequisites (course must be taken prior to this course)
STAT 7000 OR WILD 3750

Corequisites (course must be taken the same term of this course)

Prerequisite with concurrency (course may be taken prior to this course or taken during the same term)
Brief Description for Bulletin  WILD 7150 (3) LEC 3; PREREQ STAT 7000 OR WILD 3750;
Applied training in advanced analytical procedures commonly used in ecological sciences including modelling of survival, reproduction, habitat selection, population growth, density-dependence, and morphometrics.

Credit will not be given for both ________________ and ________________

<table>
<thead>
<tr>
<th>Activities</th>
<th>Contact Group</th>
<th>Hours Indiv</th>
<th>Credit</th>
<th>Max Enroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st:</td>
<td>LEC</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>2nd:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Justification (Indicate reason for change)  Dr. Steury is a new faculty member in the School with a strong background in ecological modeling and statistics, especially as it applies to ecological sciences. The faculty in the SFWS have long wanted to offer an advanced analysis course that would complement the basic statistics courses offered in Statistics. While many of the topics are covered in existing STAT courses, none cover all of the analytical tools our students need, further, our students would need to take 4 or 5 STAT courses to cover the material that will be presented in this course. The focus of this course is both discipline specific and application oriented; most of our students do not require underlying statistical theory.

Additional resources or resource shifting required. If none, please explain.
None. Dr. Todd Steury is a new faculty member in the SFWS and this course is one of two that will fulfill the teaching portion of his appointment.

Attach a copy of syllabus to add a new course.

To modify an existing course, attach a copy of the old syllabus and the new syllabus.

To add an honors version of an existing course or to add a distance education version of an existing, attach the existing syllabus and the syllabus for the proposed new course.

No attachment is required to delete course.

Contact Person  Dr. Edward F. Loewenstein
Email  loswenstein@auburn.edu  Phone #  4-1069

Revised June 2008
Approvals

Undergraduate Requests

Department

Chair

College/School Curriculum Committee

Dean

College or School

Chair

University Curriculum Committee

Graduate Requests

Department

Chair

College/School Curriculum Committee

Dean

College or School

Chair

Graduate Council

University Curriculum Committee
I. Instructor: Dr. Todd D. Steury  
   Office: 2347 Forestry and Wildlife Building  
   Office Hours: TBA  
   Office Phone: 844-9253  
   E-mail – steury@auburn.edu

II. Pre-requisite  
   STAT 7000 or WILD 3750

III. Course Format  
   The course will consist of three 1-hour lectures per week (for 3 total semester credits). Lectures will be taught in the computer lab, so that students can follow along on worked examples.

IV. Text  
   No one text covers all the techniques that we might want to cover. Thus, material will be compiled from the primary literature (e.g., Ecology, Journal of Wildlife Management, Conservation Biology, Frontiers in Ecology and the Environment, etc.).

V. 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.

VI. Course Objectives  
1. Familiarize the student with the application of advanced analytical procedures to topics commonly studied in ecological sciences.  
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.  
3. Train the student how to perform advanced analytical procedures using the computing languages R and SAS.

VII. Course Requirements/Evaluation
Students will be evaluated via assignments, quizzes, and a final exam. Assignments will include weekly reports detailing procedures learned and performed on example data and will count 50% of the total grade. The final exam, which will be comprehensive, will count for 30% of the total grade. The remaining 20% of the total grade will come from quizzes. Quizzes and exams will be short answer and multiple choice. The standard grading scale will be used (i.e., 90-100% = A; 80-89% = B; 70-79% = C; 60-69% = D; <60% = F).

VIII. Course Policies

Students are expected to attend all lectures.

IX. Academic Honesty

Students should become familiar with the Student Academic Honesty Code that is published in the latest version of the Tiger Cub. Students in this class are expected to strictly adhere to this code, and any violations of the code will be brought before the Academic Honesty Committee.

X. Justification for Graduate Courses

This is an advanced course, requiring a solid understanding of basic statistical procedures. The prerequisite for this course is STAT 7000 or WILD 3750. 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.

XI. Students with Disabilities

Students who need special accommodations in class, as provided for by the American Disabilities Act, should arrange a confidential meeting with the instructor during office hours the first week of classes - or as soon as possible if accommodations are needed immediately. You must being a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have these forms but need accommodations, make an appointment with the Program for Students with Disabilities, 1244 Haley Center, 844-2096 (V/TT) or e-mail: scw0005@auburn.edu.
<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Review of purposes of analyses; Intro to software; definitions</td>
</tr>
<tr>
<td>2.</td>
<td>Review of basic statistics and relationship to ecological modeling</td>
</tr>
<tr>
<td>3.</td>
<td>Habitat analysis across landscape scales</td>
</tr>
<tr>
<td>4.</td>
<td>Effects of temperature and other environmental variables</td>
</tr>
<tr>
<td>5.</td>
<td>Analyses of animal and vegetative growth</td>
</tr>
<tr>
<td>6.</td>
<td>Analyses of morphometric traits</td>
</tr>
<tr>
<td>7.</td>
<td>Analyses of survival</td>
</tr>
<tr>
<td>8.</td>
<td>Analyses of reproduction</td>
</tr>
<tr>
<td>9.</td>
<td>Which came first, the chick or the egg?</td>
</tr>
<tr>
<td>10.</td>
<td>General model evaluation and selection</td>
</tr>
<tr>
<td>11.</td>
<td>Multi-model inference</td>
</tr>
<tr>
<td>12.</td>
<td>Testing for density-dependence in population time-series</td>
</tr>
<tr>
<td>13.</td>
<td>Phylogenetic analyses</td>
</tr>
<tr>
<td>14.</td>
<td>Students choice – Students choose the topics; students bring own data</td>
</tr>
<tr>
<td>15.</td>
<td>Students choice – Students choose the topics; students bring own data</td>
</tr>
</tbody>
</table>
WILD 7150
ADVANCED ANALYSIS FOR ECOLOGICAL SCIENCES
ADV ANALYSIS FOR ECOLOGY

I. Instructor: Dr. Todd D. Steury
   Office: 2347 Forestry and Wildlife Building
   Office Hours: TBA
   Office Phone: 844-9253
   E-mail – steury@auburn.edu

II. Pre-requisite
   STAT 7000 or similar statistics courses

III. Course Format
   The course will consist of three 1-hour lectures per week (for 3 total semester credits).
   Lectures will be taught in the computer lab, so that students can follow along on worked
   examples.

IV. 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:
   Many of our readings will come from this book. Plus, the book is an excellent resource into
   using R for statistical analysis, and will be helpful throughout the class and beyond.

V. 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.

VI. 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, multi-model 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.
   3. Train the student how to perform advanced analytical procedures using the computing
      languages R and SAS.

VII. Course Requirements/Evaluation
   Students will be evaluated via assignments, quizzes, and a final exam. Assignments will
   include weekly reports detailing procedures learned and performed on example data and will
   count 50% of the total grade. The final exam, which will be comprehensive, will count for 30%
   of the total grade. The remaining 20% of the total grade will come from 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).

VIII. Course Policies
   Students are expected to attend all lectures.
   Make-Up Policy
Arrangement to make up 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 from the end of the period of the excused absences. Except in unusual circumstances, such as continued absence of the student or the advent of University holidays, a make-up exam will take place within two weeks from the time 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.

IX. Academic Honesty
Students should become familiar with the Student Academic Honesty Code that is published in the latest version of the Tiger Cub. Students in this class are expected to strictly adhere to this code, and any violations of the code will be brought before the Academic Honesty Committee.

X. 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.

XI. Students with Disabilities
Students who need special accommodations in class, as provided for by the American Disabilities Act, should arrange a confidential meeting with the instructor during office hours the first week of classes - or as soon as possible if accommodations are needed immediately. You must being a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have these forms but need accommodations, make an appointment with the Program for Students with Disabilities, 1244 Haley Center, 844-2096 (VT) or e-mail: scw0005@auburn.edu.

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Review of purposes of analyses; Intro to software; definitions</td>
</tr>
<tr>
<td>2.</td>
<td>Review of basic statistics and relationship to ecological modeling</td>
</tr>
<tr>
<td></td>
<td>(Review of ANOVA, regression, and relation to general linear models (GLM))</td>
</tr>
<tr>
<td></td>
<td>(Multivariate general linear models (ANCOVA))</td>
</tr>
<tr>
<td>4.</td>
<td>Effects of sampled (rather than chosen) treatments</td>
</tr>
<tr>
<td></td>
<td>(Random and mixed-effects ANOVA)</td>
</tr>
<tr>
<td>5.</td>
<td>Analyses of animal and vegetative growth</td>
</tr>
<tr>
<td></td>
<td>(Repeated measures ANOVA, nested ANOVA)</td>
</tr>
<tr>
<td></td>
<td>(Logistic regression, Poisson regression, Negative binomial regression)</td>
</tr>
<tr>
<td></td>
<td>(Zero-inflated distributions, likelihood functions)</td>
</tr>
<tr>
<td></td>
<td>Principle components analysis, ordination, factor analysis</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| 9. | Which came first, the chick or the egg? Causality modeling  
(Path analysis, structural equation modeling)  
| 10. | General model evaluation and selection  
(Akaike information criterion, partial likelihood ratio tests)  
Readings: Chamberlain 1965, Stephens et al. 2007 |
| 11. | Multi-model inference  
Readings: Anderson et al. 2000 |
| 12. | Testing for density-dependence in population time-series  
(Bootstrap, jackknife, Monte Carlo simulation)  
| 13. | Adaptive management of resources  
(Bayesian analyses)  
| 14. | Students choice – Students choose the topics; students bring own data |
| 15. | Students choice – Students choose the topics; students bring own data |

Sources of Readings:


