WLF 301 - Sampling Design – Spring 2018

Lecture: 1:00-2:00 PM Monday & Wednesday. Location: Murie 107
Lab: 9:15 AM -12:15 PM Friday. Location: Murie 309

Course Description: Sampling theory and design for animal populations and their habitats. Probability theory, finite population sampling, capture - mark - recapture sampling and research design will be examined through lectures, labs, and a term project.

Instructor: Greg Breed
Office: 401 Irving I
gabreed@alaska.edu
474-1835
Office hours: Monday 11:00-12:00 or by appointment

Teaching assistant: Devin Johnson

Prerequisites: WLF F101, MATH F107X or MATH F161X, or permission of the instructor
Recommended: STAT F200 or F300


Course policies:

- Students are expected to attend all lectures and labs, and to actively participate in class discussions.
- Students are to work independently on all assignments, unless otherwise instructed. If plagiarism is detected, students will be given a grade of zero on their assignment/test. Note that material lifted from the internet or term papers previously submitted by students at UAF or other universities is very likely to be detected as plagiarized using online resources such as turnitin.com and plagiarism.org.
- Students are expected to submit homework assignments on time, and grades will be reduced by 10% each day after the due date.
- I work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities.
- Please, no computers, tablets, or smart phones during lectures. Take notes using a notebook and read any material online before or after lecture. If handouts are needed for the class, I will print and provide them. Slides used for lectures will be posted via blackboard - but some material may be written on the board and not available online, so note taking is essential.
- The M3 cafe is directly across from the classroom. Although I have no issue with drinks or food in class, please do not get up in the middle of class to buy them.
Grading policy: Final grade will be calculated as follows:
Exams (45%: 2 midterms, 1 final (15% each))
Class Participation (10%). Attendance taken in labs but not lecture.
Lab Assignments (20%). About 8, worth 2.5% each.
Term Project (25% - 12.5% for report and 12.5% for presentation)

Letter grade scale:
A (94-100)
A- (90 - 93.99)
B+ (88.5-89.99)
B (81.5-88.5)
B- (80-81.49)
C+ (78.5-79.99)
C (70-78.49)
D (60-69.99)
F (below 60)

Equation Sheet
R tutorial and basics: Find here a useful web page for basic R functionality

Calendar

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Lab</th>
<th>Readings</th>
<th>Assignment</th>
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<tbody>
<tr>
<td>Jan 17</td>
<td>Lecture 1:</td>
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<td>Do: Collect Moose Data</td>
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<td></td>
<td>• Course Mechanics, What is Sampling Design?</td>
<td>Krebs Chap. 1 (p 1-6)</td>
<td>McGrath Moose Data (xls)</td>
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<td></td>
<td>• Moose Data Assignment</td>
<td>Morrison 42-48</td>
<td>McGrath Moose Data (csv)</td>
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<td>Jan 19</td>
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<td>Jan 22</td>
<td>Lecture 2:</td>
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<td>• Types of Data</td>
<td>Krebs Chap. 1 (p 7-17)</td>
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<tr>
<td>Date</td>
<td>Lecture</td>
<td>Notes</td>
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| Jan 24   | Lecture 3: | - Simple Random Sampling  
           - Measures of Precision, Variation, and Bias  
           - Expectation  
           Term Project Instructions  
           Capstone Description  
           Captstone Rubric  
           Morrison 137-146  
           Barnett (1974)  
           Kufeld et al. (1980) |
| Jan 26   | Introduction to the Computer Lab | Install R  
           Lab 1: Introduction to R and simple data handling  
           Due: Moose Sample (Bring file of sampled weights to lab)  
           Do: Lab 1 report  
           R Code for sampling |
| Jan 29   | Lecture 4: | Stratification |
| Jan 31   | Lecture 5: | Systematic Sampling Designs  
           Systematic Sampling Designs  
           Krebs Chapter 8  
           DeBarba et al. (2010) |
| Feb 2    | Greenland Butterfly Paper | Lab 2: Simple Random Sampling  
           r_code for Lab 2  
           Equation Sheet  
           Due: Lab 1 report (10 pts)  
           Do: One Page Project Proposal  
           Do: Lab 2: Simple Random Sampling Report |
Feb 5  
**Lecture 6:**
- Sample Size, Effect Size, Precision
- Confidence Intervals  
  *Krebs Chapter 7 (p. 277-292)*

Feb 7  
**Lecture 7:**
- Confidence Intervals
- Sample Size Continued
- Power Analysis  
  *Krebs Chapter 7 (p. 310-320)*

Feb 9  
**Lab 3: Stratified Sampling**

Lab 3 Data (csv)

Project Organizational Meetings
- Discuss Research Projects (Individual Meetings)

**Due:** Lab 2 Report (10 pts)

**Do:** Stratified Sampling Assignment

Feb 12

**Lecture 8:**
- Covariance, Correlation
- Quadrats  
  *Krebs Chapter 4 (Pages 137-160)*

Feb 14

Lab 4: Sample Size Calculations

Willow Growth Data

**Do:** Lab 4 Report

**Due:** Lab 3 Report (10 pts)

Feb 16

Feb 19  
**Lecture 9:**
- Index of Abundance and Detection Probability  
  *Johnson 2008 Text 158-167*

Feb 21  **Review session**

Feb 23  **Midterm 1**
# Exam Data

**Lecture 10:**

**Feb 26**

ANOVA

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**Lecture 11:**

**Feb 28**

Linear Regression

[Gotelli & Ellison](#)

Chapter 9: 239-250

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**Mar 2**

Data collection for projects

**Due:** Lab 4 Report (10 pts)

**Due:** Sampling Design for Project

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**Mar 5**

**Lecture 12: Transects**

- Transects

[Krebs Chapter 5](#)

Pages 199-212

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**Mar 7**

Fast Design Exercise

**Lecture 13: Detection**

- Estimation from removals
- Detection

[Text 175-184](#)

Keech et al. (2011)

McCallum 2005

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**Mar 9**

**Lab 5: Squirrel Index**

2014-15 Results

**Lab 6: Double Count**

**Do:** Double Count Assignment

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**March 12 - 16, Spring Break**

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**Mar 19**

**Lecture 14: Mark-Recapture**

- Estimating Abundance:
  - Capture-Mark-Recapture Sampling

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**Mar 21**

**Lecture 15: Habitat Sampling**

- Methods for Low Vegetation
- Methods for Tall Vegetation
- Satellite Imagery

Nichols and Williams 2006

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**Mar 23**

Data Collection for Projects

**Do:** Anova & Regression Homework
### Anova & Regression Homework

**Due:** Double Count Homework (10 pts)

#### Lecture 16:

**Mar 26**
- Time Series
- Monitoring
- *Salmon / Sea lice*

#### Lecture 17

**Mar 28**
- Behavioral Sampling

- *Altmann (1974)*
- *Vigallon 2005*
- *Robinette 2001*
- *Balda 1989*

#### Lecture 18

**April 2**
- Designs for measuring movement

#### Lecture 19

**April 4**
- Experiments

- *Krebs Chapter 10*

#### Lecture 20

**April 9**
- *Review Sheet 2*

- *Krebs Chapter 11* pp 459-482

- *Hurlbert 1984*

#### Lecture 21

**April**
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<th>Date</th>
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<th>Due Note</th>
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<td>Behavior Sampling</td>
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<td>April 16</td>
<td>Midterm 2</td>
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<td>April 18</td>
<td>Lecture 22</td>
<td>Clark 1982</td>
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<td>April 20</td>
<td>Open for Project Data Analysis</td>
<td>Due: Project Data</td>
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<td>April 23</td>
<td>Data Management</td>
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<td>April 25</td>
<td>Fast Design Exercise</td>
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<td>April 27</td>
<td>Project Presentations</td>
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<td>April 30</td>
<td>Review for Final</td>
<td>Due: Term Papers</td>
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<td>Week of May 1</td>
<td>Final Exam Analysis Question Data</td>
<td>Wednesday, May 3, 1:00 - 3:00</td>
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