

# FORS 201 – Biometrics

Autumn 2017



Instructor: Dr. David Affleck  
Clapp Building (CHCB) 430  
david.affleck@umontana.edu  
Office hours Fridays 1 – 3 pm

Assistant: Biga Marshall  
Clapp Building (CHCB) 460  
abigail.marshall@umontana.edu  
Office hours TBD in Stone Hall 107

Lectures: MWF 9:00 – 9:50 am in SS 352

Labs: Section 1 (CRN 72963) M 10:00 – 11:50 am in Stone Hall 106 &107  
Section 2 (CRN 72964) W 12:00 – 1:50 pm in Stone Hall 106 &107

## Course summary:

Introduction to data collection, data analysis, probability, and inferential statistics for forestry and the natural resource sciences. The course focuses on natural resource and environmental applications of statistical methods, ranging from descriptive graphical and quantitative analyses to the use of formal probability models, interval estimation, significance tests, and linear regression modeling.

## Course learning outcomes:

*By the end of this course you will:*

1. Recognize the ubiquity and importance of variation in natural systems and the consequent need for statistical reasoning.
2. Be able to effectively summarize data to characterize central tendency, variation, bivariate relationships and other important distributional features of natural resource data.
3. Appreciate the role of randomization in data collection and statistical inference.
4. Understand the concept of sampling distributions, and the utility of the Central Limit Theorem.
5. Be familiar with probability distributions commonly used in statistical inference.
6. Be able to apply appropriate statistical methods to characterize uncertainty, to measure evidence in support of hypotheses, and to make quantitative predictions.

## Prerequisites:

Probability and linear math, or (pre-)calculus (M115, 121, 122, 151, 162, 171, or 172).

## Textbook:

There is no required textbook for the course, but readings from *Statistics*, 4<sup>th</sup> ed. (Freedman, Pisani, & Purves) will be recommended throughout the semester. Problems on quizzes and exams will draw on material covered in those readings and in class. A copy of the book is on reserve in the Mansfield Library, and copies are available in the bookstore and online.

## Grading Policy:

There will be a midterm exam worth 15% of the course grade, a final exam worth 30%, and a sequence of laboratory assignments collectively worth 50%. An intermittent series of short online quizzes will account for the remaining 5% of the grade. Traditional letter grades will be assigned based on the combined percentage grade:

A  $\geq$  80%      B 79-70%      C 69-60%      D 59-50%      F <50%

Note that the class is offered for traditional letter grade only.

## Exams:

The midterm and final exam will draw on the material presented in class and labs, and from that in assigned readings. A calculator and a formula sheet (double-sided but no larger than 5" x 8") will be permitted.

The final exam is scheduled for 8 – 10 am on Thursday, Dec. 14 (in SS 352).

## Labs:

There are weekly assignments focusing on applications of the material covered in lectures. These exercises consist of data analysis, problem solving, and computing. Exercises will be assigned in the lab period and will be due before the subsequent lab (i.e. in one week's time), unless otherwise noted.

Group work is strongly encouraged in labs but, unless noted otherwise, every student must submit his or her own work.

## Notes:

Class materials and announcements will be posted on the FORS201 Moodle website, which can be accessed from [moodle.umt.edu](http://moodle.umt.edu).

Per university policy, all electronic communication associated with the course must be sent to University of Montana email accounts. Ensure that your [umconnect.umt.edu email](mailto:umconnect.umt.edu) is properly configured and active!

All course activities are governed by the Student Conduct Code, which embodies the ideals of academic honesty, integrity, human rights, and mutual respect. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the [Student Conduct Code](#).

Students with disabilities may request reasonable modifications by contacting me. The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS).

Tentative course schedule:

Week	Lecture & laboratory topics
Aug 28	Course overview
Sept 4	Concerning data & variables. Tabular and graphical summaries of categorical and quantitative variables. <i>* Monday is Labor Day – no class, no lab meeting on Monday.</i>
	Lab 1: Introductions to the computer labs and Microsoft Excel.
Sept 11	Measuring central tendency: mean(s), median, and mode (proportions too). Characterizing variation: root mean square and standard deviations.
	Lab 2: Describing and interpreting data distributions.
Sept 18	Ranks, percentiles, standardizations, and standard scores. Measurement error. <i>* September 21 is the last day that the course can be dropped on Cyberbear with a refund.</i>
	Lab 3: Characterizing center, spread, position.
Sept 25	Graphical analysis and description of bivariate relationships. Strength of association & correlation.
	Lab 4: Creating and interpreting scatterplots; correlation.
Oct 2	Describing bivariate relationships using linear regression.
	Lab 5: Linear regression.
Oct 9	Study design: Comparative experiments, observational studies, and sampling. <i>* No lab on Wednesday (Oct 11).</i>
Oct 16	Introduction to probability and probability models.
	Lab 6: Sampling and design concepts.
Oct 23	Common probability distribution: the binomial distribution and the normal curve <b>Midterm Exam from 9 – 10 am in SS 352 on Wednesday, Oct 25<sup>th</sup></b>
	Lab 7: Probability models and calculations.
Oct 30	Specifying probability models; determining expected values and standard errors. <i>* Dropping the class after Sept. 21 but before Nov. 2 requires submitting a form with instructor and advisor signatures; you will receive a 'W' on your transcript and no refund. After Nov. 2, classes can be dropped only under limited and unusual circumstances and will require approvals from instructor, advisor, and Associate Dean.</i>
	Lab 8: Applications of the binomial and normal distributions.
Nov 6	The Central Limit Theorem and the normal approximation for probability histograms <i>* No class on Friday in recognition of Veterans' Day</i>
	Lab 9: Working with probability models; deriving expected values and standard errors.
Nov 13	Introduction to interval estimation; confidence intervals for population proportions
	Lab 10: Applications of the central limit theorem.
Nov 20	Estimating the accuracy of the sample mean. <i>* No labs this week. Wednesday and Friday are part of the Thanksgiving Break – no classes.</i>

<b>Week</b>	<b>Lecture &amp; laboratory topics</b>
Nov 27	Introduction to significance testing: mechanics, test statistics, critical values and p-values. Lab 11: Confidence interval estimation.
Dec 4	Contingency tables, tests of independence, and the chi-squared distribution. Analysis of variance. Lab 12: Significance tests for population means.
Dec 11	Course Review. <i>* No labs this week; classes meet on Monday only this week.</i>
<b><i>Final exam from 8.00 – 10.00 am in SS 352 on Thursday, December 14<sup>th</sup></i></b>	