

FORS 201 – Biometrics

Autumn 2016

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Office hours Thursdays 3:30 – 5 pm

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

Labs: Section 1 (CRN 73321) M 10:00 – 11:50 am in Stone Hall 106 &107
Section 2 (CRN 73322) 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 environmental 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 need for statistical reasoning.
2. Be able to effectively summarize data to characterize central tendency, spread, 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. However, required and recommended readings will be periodically assigned. These will be posted on the course website.

Grading Policy:

There will be a midterm exam worth 15% of the course grade, a final exam worth 25%, and a sequence of laboratory assignments collectively worth 50%. There will also be a series of short quizzes issued online on an intermittent basis that will account for the remaining 10% of the grade. Traditional letter grades will be assigned based on the combined percentage grade:

A	B	C	D	F
≥ 80%	79–70%	69–60%	59–50%	< 50%

Note that this 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 Monday, Dec. 19 (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.

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 topics
Aug 29	Course overview. Data, variables. Categorical data analysis. Lab 1: Introductions to the computer labs and Microsoft Excel.
Sept 5	Tabular and graphical analysis of quantitative variables. Measuring central tendency: mean(s), median, mode...and proportions too. <i>* Monday is Labor Day – no class, no lab meeting on Monday.</i> Lab 2: Describing and interpreting data distributions.
Sept 12	Characterizing variation: ranges and standard deviations. Also ranks, percentiles, standardizations, and z-scores. Lab 3: Characterizing center, spread, position.
Sept 19	Graphical analysis and description of bivariate relationships. Strength of association & correlation. <i>* Sept 19 is the last day that the course can be dropped on Cyberbear with a refund.</i> Lab 4: Creating and interpreting scatterplots; correlation.
Sept 26	Describing bivariate relationships using linear regression. Lab 5: Linear regression. Decomposing sums-of-squares.
Oct 3	Populations vs. samples; estimates vs. parameters. Designed experiments vs. observational studies. <i>* No lab on Wednesday (Oct 5).</i>
Oct 10	Stratified, systematic, and cluster sampling designs. Midterm Exam from 9:10 – 10 am in SS 352 on Friday, Oct 14th Lab 6: Sampling and sampling concepts.
Oct 17	Introduction to probability models. Sampling distribution of a proportion: the binomial distribution. Lab 7: Probability models & sampling distributions.
Oct 24	The normal distribution, the sampling distribution of a mean, and the Central Limit Theorem. Lab 8: The binomial distribution and the sampling distribution of a proportion.
Oct 31	Introduction to significance testing: mechanics, test statistics, critical values and p-values. <i>* Dropping the class after Sept. 19 but by Oct. 31 requires submitting a form with instructor and advisor signatures; you will receive a 'W' on your transcript and no refund. After Oct. 31, classes can be dropped only under limited and unusual circumstances and will require approvals from instructor, advisor, and Associate Dean.</i> Lab 9: The normal distribution; applications of the Central Limit Theorem;.
Nov 7	Testing population proportions. <i>* No labs this week. No class on Friday: Veterans' Day.</i>
Nov 14	Testing population means & Student's <i>t</i> distribution. Lab 10: Significance testing.
Nov 21	Introduction to interval estimation; confidence intervals for population proportions and means. <i>* No labs this week. Wednesday and Friday are part of the Thanksgiving Break – no classes.</i>
Nov 28	Regression redux: the sampling distribution of the regression line and its coefficients. Interval estimates for regression coefficients and predictions. Lab 11: Confidence interval estimation and interpretation.
Dec 5	Contingency tables, tests of independence, and the chi-squared distribution. Analysis of variance and the F distribution. Lab 12: Interval estimation and inference for regression.
Dec 12	Course Review. <i>* No labs this week; courses meet on Monday only this week.</i>
Dec 19	Final exam from 8.00 – 10.00 am in SS 352 on Monday, December 19th

