FORS 201 – Biometrics

Autumn 2019

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Office hours Fridays 1 – 2:30 pm

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Office hours Tuesdays (am, TBD) in Stone Hall 106

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

Labs: Section 1 (CRN 72447) M 10:00 – 11:50 am in Stone Hall 106 &107
Section 2 (CRN 72448) 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, 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 or higher).

Textbook:

There is no required textbook for the course, but readings from *Statistics,* 4th 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 account for the remaining 5% of the grade. Traditional letter grades will be assigned based on the combined percentage grade:

A ≥ 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 currently scheduled for 8 – 10 am on Wednesday, Dec. 11 (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 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 26	Course overview; data structures; tabular & graphical summaries of categorical variables. --- Lab 1: Introductions to the computer labs and Microsoft Excel.
Sept 2	Tabular and graphical summaries of quantitative variables. Measuring central tendency: mean(s), median, and mode (proportions too). ** Monday, Sept. 2, is Labor Day – no lecture or lab meeting on Monday.* --- Lab 2: Describing and interpreting data distributions.
Sept 9	Characterizing variation: root mean square and standard deviations. Ranks, percentiles, standardizations, and standard scores. --- Lab 3: Quantifying distributional features.
Sept 16	Graphical analysis and description of bivariate relationships. Strength of association & correlation. ** September 16 is the last day that fall semester courses can be dropped on Cyberbear with a refund.* --- Lab 4: Creating and interpreting scatterplots; correlation.
Sept 23	Describing bivariate relationships and prediction via linear regression. --- Lab 5: Linear regression.
Sept 30	Study design: Comparative experiments, observational studies, and sampling. --- Lab 6: Study design and sampling concepts.
Oct 7	Introduction to probability and probability models **Midterm Exam from 9 – 10 am in SS 352 on Friday, Oct 11th** --- Lab 7: Probability models and derivations.
Oct 14	Common probability distribution: the binomial distribution and the normal curve. --- Lab 8: Applications of the binomial distributions.
Oct 21	Expected values and standard errors. --- Lab 9: Working with the normal distribution; deriving expected values and standard errors.
Oct 28	The Central Limit Theorem and the normal approximation for probability histograms. ** Dropping fall semester classes after Sept. 16 but before Oct. 28 requires submitting a form with instructor and advisor signatures; you will receive a 'W' on your transcript and no refund. After Oct. 28, classes can be dropped only under limited and unusual circumstances and will require approvals from instructor, advisor, and Associate Dean.* ** No lab meeting on Wednesday, Oct. 30.*
Nov 4	Introduction to interval estimation; confidence intervals for population proportions --- Lab 10: Applications of the central limit theorem.
Nov 11	Estimating the accuracy of the sample mean ** No class or lab meeting on Monday in recognition of Veterans' Day* --- Lab 11: Confidence interval estimation.
Nov 18	Introduction to significance testing: mechanics, test statistics, critical values and p-values. ** No lab meeting on Wednesday, Nov. 20.*
Nov 25	Contingency tables, tests of independence, and the chi-squared distribution. ** No lab meetings this week. No class meetings on Wednesday and Friday (Thanksgiving Break).*

Week	Lecture & laboratory topics
Dec 2	Regression inference and analysis of variance; course review. --- Lab 12: Significance testing.
Dec 9	***Final exam from 8 – 10 am in SS 352 on Wednesday, December 11th*** ** No lecture or lab meetings this week.*