Instructor: Jon Graham, Math 204, 243-2561, jgraham@mso.umt.edu

Time/Room: Mon, Wed, Fri, 1:10-2:00pm, in Math 306

Textbook: Sampling / Thompson, 3rd ed.

Office Hours: To be announced, By appointment

Course Webpage: [http://www.math.umt.edu/graham/stat549/](http://www.math.umt.edu/graham/stat549/)

Grading: Homework: 30% Exams 1,2: 40% Final Project: 30%

Prerequisites: STAT 421 or 451 or consent of instructor.

**Homework** will be assigned every one or two weeks, to be handed in one or two weeks later depending on length. I will accept one late homework, and the lowest homework grade will be dropped. Homework is not only a fairly substantial portion of your grade, but is vital to your success in this class. Working with other students on homework is allowed and even encouraged, as long as you hand in your own work, and do not simply copy someone else’s work. On problems requiring computer output, please hand in only that output relevant to the questions asked. Solutions to all problems will be provided.

**Exams 1 & 2** will be cumulative and closed book. More about the exams, including the exact dates of the exams will be given later. If you cannot make it to an exam, you must let me know BEFORE the exam is given. No make-up exams will be given without a documentable reason for missing the exam.

The **Final project** consists of both a written and oral component. The oral presentations (either talks or posters) will be made the final week of class and during the final exam time slot (1:10-3:10pm, Monday, 12/10), and the written reports are due at the time of the final exam on December 10. The projects should be of one of the following types:

1. Presentation and an application (carried out by you) of a sampling methodology which has not been discussed in class. A good source of papers discussing new sampling techniques, particularly in biology, is the journal *Biometrics*.

2. Development of a sampling design for a project (e.g. thesis) which you will be carrying out. You must be very specific and have enough information to develop an effective design.

3. Evaluation of a sampling method or comparison of two or more sampling methods in a small-scale field test to see how theory translates into reality. This will involve several replications of each method.

**Course Material and Objectives:** This course provides both the theory and application of methodology for selecting samples from populations to efficiently estimate parameters of interest. Some sampling methods covered are simple random, systematic, cluster, stratified, multistage, line transect, distance, adaptive, and spatial sampling. The focus of the course will be jointly on the application of these sampling techniques and the theory governing them. The computer package **R** will be used throughout the course both in class and on homework assignments.

**Additional Course Information:** The last day to add this course through Cyberbear is Wednesday, September 5. The last day to drop this course or change the grading option through Cyberbear is Monday, September 17. Between Tuesday, September 18 and Monday, October 29, you can drop or change the grading option with a drop/add form with your advisor’s signature and instructor’s signature. After October 29,
dropping the course or changing the grading option may only be done through the university petition process. We will not recommend approval of late drops or changes in grading options except in extreme circumstances (see the UM online catalog).

**Academic Misconduct:** All students must practice academic honesty. 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. The Code is available for review online at http://life.umt.edu/vpsa/student_conduct.php.

**Disability Services:** The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. We will work with you and DSS to provide an appropriate accommodation.

Questions are strongly encouraged, both during class and at office hours. If you are lost or confused, please let me know.

**Summary of Topics**

1. Overview of Sampling Designs (Chapter 1)
   (a) Sampling Units, Populations, Sampling plans
   (b) Sampling Distributions, Bias, Variance, MSE
2. Basic Sampling - Estimation of Means & Totals (Chapters 2-6)
   (a) Simple Random Sampling
   (b) Confidence Intervals
   (c) Sample Size Determination
   (d) Estimating Proportions and Ratios
   (e) Unequal Probability Sampling
3. Auxiliary Information in Sampling (Chapters 7, 8)
   (a) Ratio Estimation
   (b) Regression Estimation and Models
4. Other Sampling Designs (Chapters 11-14)
   (a) Stratified Sampling
   (b) Cluster Sampling
   (c) Systematic Sampling
   (d) Multistage Designs
   (e) Double Sampling
5. Detectability Methods (Chapters 16, 17)
   (a) Detectability and Sampling
   (b) Line Transects
6. Adaptive Sampling (Chapters 23-26)
7. Spatial Sampling (Chapters 20, 21)
   (a) Kriging (Spatial Prediction)
   (b) Spatial Designs