FNR 3410C - NATURAL RESOURCE SAMPLING

Fall 2013
Credits: 3; Prereq: STA 2023.

Basic concepts of sampling. Design of cost-effective sample surveys. Sampling methodology applicable to natural resources: simple random, stratified, systematic, multi-phase and multi-stage. Cluster sampling, ratio, regression and difference estimation. Line transects. Computer simulation of sampling methods. Intro to remote sensing, geographic information and global positioning systems.

COURSE HOURS
Lecture Period 2 8:30-9:20 MW MAEB 0211 (Mechanical & Aerospace Engineering)
Lab 1 Period 7-9 13:55-16:55 M BLK 0415 (Black Hall)
Lab 2 Period 2 5-7 11:45-14:45 W NZ 219 (Newins-Zeigler)

INSTRUCTOR

Robert Ahrens rahrens@ufl.edu
Office McCarty C 402
Office Hours M 9:30-11:30 T 13:00-15:00 or by appointment

TEACHING ASSISTANTS

Bryan Matthias
Office McCarty C 401
Office Hours T 13:00-15:00 or by appointment

Nicholas Ducharme-Barth
Office McCarty C 429
Office Hours T 10:00-12:00 or by appointment

PURPOSE OF THE COURSE
Natural Resource Sampling provides a hands-on approach to the theory and techniques for sampling various characteristics of a variety of natural resources and attributes of the environments in which they are found. The course begins with a review of elementary statistics and continues with specific applications of field sampling methods commonly used in forestry, fisheries, ecology, and wildlife management. In conjunction with learning various sampling methods, student will be exposed to a variety of analysis techniques and application of the data obtained during laboratory sampling sessions.

OBJECTIVES
By the end of the course, students should demonstrate an understanding of the following concepts and techniques:
- Statistical terminology and descriptive statistics
- Sampling theory and design
- Hypothesis testing; t-tests, Anova, and simple regression
- Vegetation sampling methods, e.g. fixed plot, variable plot, line intercept and intersect methods
- Terrestrial and aquatic animals methods, e.g. double sampling, line transects, variable circular plots, point counts, recapture techniques, radio telemetry, fish sampling, and depletion methods
- Environmental sampling, e.g. light, soil, water, weather data

LEARNING OUTCOMES
Upon successful completion of the course, students should:
- Demonstrate an understanding of the underlying theories upon which sampling methods and frequently used statistics are based
- Develop hypotheses and demonstrate application of proper experimental design to sampling of animals, plants and environmental variables
- Demonstrate appropriate sampling methodology and use of equipment to collect animal, plant and environmental data
- Compute basic descriptive statistics for animal, plant and environmental data
- Use computers and software programs to analyze dataPrepare graphs and tables using computer software to summarize descriptive data and statistical analysis
- Write scientific reports to interpret, present and explain results of data collection

FORMAT
This course consists of instruction in both the classroom and the field. We will use the class meeting time for formal instruction including a combination of lecture, discussions, class activities, and computer labs. You are expected to actively participate during classes- expect to be called upon to answer questions, perform calculations, and work on group activities. The field labs will reinforce and strengthen concepts learned in class through hands-on activities. During the field lab you will practice techniques for properly handling equipment and collecting data. The data will be analyzed and presented in lab reports (see description of assignments below).

Much of the lab work done in FNR 3410 is conducted in the field, regardless of weather conditions. Whenever field (outdoor) labs are scheduled, you should wear appropriate field clothing and also bring note taking supplies and a camera if you have one. If an outdoor lab is scheduled and inclement weather prevents completion of the lab it will be rescheduled. Never assume a lab is cancelled.

REQUIRED MATERIALS
You should bring a laptop, scientific calculator to each class, as well as a flash drive (or some other storage device) compatible with campus computers. You will need the ability to take notes and record data in the field under wet conditions. At times data sheets will be provided. The most useful setup is a clipboard with storage.

There is no required text for the course. There are substantial online materials on the web to assist you with statistical calculations. Below are a number of suggested information sources. Additional readings will be provided on the course Sakai site for particular topics.

www.khanacademy.org
mathworld.wolfram.com

Cochran, W.G. 1963. Sampling techniques. John Wiley and Sons, New York, NY.
Krebs, C.J. 1999. Ecological methodology.
Schluter, D. and Whitlock, M. The Analysis of Biological Data.
Sokal, R.R. and F.J. Rohlf. 1995. Biometry.
Williams, B.K., J.D. Nichols, and M.J. Conroy. 2002. Analysis and Management of Animal Populations.

ELECTRONIC COMMUNICATIONS

Course materials will be available through the Sakai e-learning site (https://lss.at.ufl.edu/). You will find a link for handouts (syllabus, assignments, lab data) and lecture presentations. Presentations may not be available prior to class and it is your responsibility to take notes. On occasion, an email will be sent to you via Sakai regarding updates to the syllabus, clarifications of assignments, or changes in due dates. If you aren't doing so already, you should be checking your Sakai email on a regular basis.

EVALUATION AND PERFORMANCE CRITERIA

Evaluation Method	Points / % of total	
Class participation	75 pts	17%
Assignments	100 pts	22%
Lab reports	80 pts	17.5%
Group Project	70 pts	15.5%
Midterm Exams	125 pts	28%

Letter grades will be assigned as follows: A (92-100), A- (90-91), B+ (88-89), B (83-87), B- (80-82), C+(77-79), C (73-76), C-(70-72), D+(67-69), D (63-66), D- (60-62), E (<60)
 A complete explanation of the UF Grading policies can be found at : http://www.registrar.ufl.edu/

At the very minimum, the student is expected to attend class, complete all assignments on time, and actively participate during class discussions. 'Grading rubrics', which describe requirements of the assignment and the criteria used for evaluation, will be available on the e-learning site for this course. Studying these criteria will help improve your performance.

UF attendance policies can be found at http://www.registrar.ufl.edu/catalogarchive/01-02-catalog/academic_regulations/academic_regulations_013_.htm. Unexcused late work or absences will result in a point loss 10% of the total value for the first late day and 5% for each subsequent late day (weekend days count too!). Exams will not be reschedules for unexcused absences. Arrangements to make up missed exams or turn in late assignments for excused absences must be made with the professor in advance of the due date.

DESCRIPTION OF ASSIGNMENTS

Homework Assignments

The homework assignments will generally consist of a set of calculations to reinforce materials presented. You will be required to submit the homework in class on the day it is due. Document templates with the questions and room to show your work will be available on the Sakai site. Remember to include your name and Gator ID number on your submission. Assignment will lose 1 point for every day they are turned in late and late submission must be turned into the instructor's office.

Lab papers

The purpose of the lab exercises is to gain experience with the techniques used in resource sampling and to reinforce the methods for analyzing data. Your lab report will be written in the format of a *scientific paper* and contain the following sections: abstract, introduction, methods, results, and a discussion. You will receive and should refer to the Report Writing Guidelines and the Grading Rubric to review the specific criteria needed in each section. Your grade will be based on accuracy of calculations, clarity of text, grammar, and formatting/presentation. Lab papers will be done in groups of 5 members. Each lab report is worth 40 points, the instructor using the criteria presented in the grading rubric will determine 75% of your grade and 25% of you grade will be determined by your group's evaluation of your participation in the preparation of the report. The purpose of this grading system is to encourage participation of all individuals and to reinforce the reality that in the work place you will be required to work within teams and will be evaluated on your contribution. Each individual in the group will submit an evaluation slip ranking group individuals including themselves from 1-5 with respect to their participation level. For example, your report is evaluated to worth a B or 85% and you are given 100% for your participation, your final mark would be 35.5 or 89% or a B+.

Group Project

In groups of 5 you will write a report and present a brief oral summary of a topic of your group's choice. These group projects will have a clear hypothesis that you are testing and involve the application of one or some of the sampling methods presented in the course. Projects will be written up as a scientific paper and require a 15 minute oral presentation at the end of the term. These projects are worth ~16% of you grade and will be evaluated accordingly. As with the lab reports, 75% of your grade and 25% of you grade will be determined by your group's evaluation of your participation in the collection of data and preparation of the paper. It is strongly recommended that you establish a project group early in the term and work steadily through the term.

Exams

The exams are intended to evaluate your understanding of the conceptual material, and to demonstrate your critical thinking and problem solving skills in applying these concepts and techniques under a variety of sampling scenarios. The format of the exam will be multiple-choice and require calculations, matching, fill-in-the-blank, and short answer selection.

PARTICIPATION

As a natural resource professional you are expected to assume the responsibility of choosing when absence from class or lab is to your personal or professional advantage. Whatever reason may justify your absence, you are entirely responsible for obtaining the information for absence from the exams (of course some situations merit exceptions). You cannot make up a missed lab!

Students are encouraged to show their engagement with this class through attendance, class contributions, and enthusiasm. Any unexcused absence from class lectures will result in a 5-point reduction in your participation grade; unexcused lab absences will result in a 15-point reduction. Attendance for labs will be monitored at every lab and attendance will be taken during 10 lecture

sessions. The dates during which lecture attendance will be taken will be determined at the beginning of the term.

Labs: Labs are structured to ensure sufficient time to complete the required exercises and travel to and from the site. You will be required fro some labs to use the campus bus system to commute to NATL, the Natural Area Teaching Laboratory (natl.ifas.ufl.edu). The 125 & 126 will get you closest to the NATL area and the 20 & 21 will get you close. Labs will start 15 minutes after the start time on these days. You will receive ample warning in advance of these labs.

Special Labs: There will be two Saturday optional labs. These will be on Saturday September 14th and Saturday October 19th. On Saturday September 14th we will be traveling to Newnan's Lake to sample the fish community using trawls and electrofishing and measure aspects of water chemistry. On Saturday October 19th to Cedar Key to sample oysters beds and aspects of the spartina marsh community. You will need to sign up for these labs in advance.

Safety: Much of this course entails fieldwork where the opportunity exists that you will be injured. Injuries range from relatively minor (scratches, sunburn, insect bites, etc) to potentially life-threatening (car accidents, snake bites, Lyme disease, skin cancer, heatstroke). These hazards are part of your career and should be taken seriously. Students should dress appropriately (closed-toed shoes, long pants, sunblock, insect repellant, etc.) and act appropriately. Avoid fooling around, do not push things over (e.g., trees or snags), always use equipment in the way it was designed for and avoid unnecessary risks. While I endeavor to keep students safe, it is the ultimate responsibility of the student to safeguard their health and safety. By enrolling in this course, you are accepting this responsibility.

If you have a medical condition that may require treatment it is your responsibility to inform the instructor before the course starts, about: (1) your specific condition, (2) where you keep your medicine, and (3) how to administer emergency treatment should the situation arise.
Field labs are long and potentially away from any facilities; therefore, it is your responsibility them, in order to continue the laboratory.

CODE OF CONDUCT
All students are expected to abide by the Student Honor Code as described in the Student Handbook (http://www.registrar.ufl.edu/catalog/policies/students.html). Students are expected to behave in a professional and courteous manner towards instructor and other classmates. This includes turning off AND putting away your cell phone during class.

Plagiarism (http://web.uflib.ufl.edu/msl/subjects/Physics/StudentPlagiarism.html) is taken very seriously at this institution, and can result in a reduced grade, failure of the course, and possible dismissal from the college. Plagiarism includes: 1) the direct use of any written material (including internet sites!!) without proper quotations and citation or 2) the submission of a document, in part or wholly authored by someone other than the student. It is up to the professor to evaluate the severity of any infraction and to determine the disciplinary action to be taken. The student should also be aware of his/her legal rights as defined in the Student Honor Code.

UNIVERSITY SERVICES
You have full access to many student services available through the University of Florida, including:

Career Resource Center, http://www.crc.ufl.edu/, Reitz Union, 352-392-1601, career development assistance and counseling

Disability Resource Center, http://www.dso.ufl.edu/drc/, Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

Sexual harassment, http://www.hr.ufl.edu/eeo/sexharassment.htm, It is the policy of The University of Florida to provide an educational and working environment for its students, faculty, and staff that is free from sex discrimination and sexual harassment.

Counseling Services, http://www.dso.ufl.edu/supportservices/campuscounseling.php

UF Software Services, http://helpdesk.ufl.edu/software.php, As a UF student you can have access to Microsoft and Adobe software at substantial discounts.

Tentative Schedule
Note that this schedule may change during the term. A = assignment and Lab = lab paper.
Period 2 8:30-9:30 Period 5-7 11:45-2:45 Period 7-9 1:55-4:55

DoW	Day	Month	Period	Type	Topic	Assignments
W	21	Aug	2	Lec	Course introduction	
M	26	Aug	2	Lec	Introduction to sampling	
M	26	Aug	7-9	Lab	Introduction to basic equipment and Excel	A1 out
W	28	Aug	2	Lec	Basic Statistics	
W	28	Aug	5-7	Lab	Introduction to basic equipment and Excel	
M	2	Sept	2	Lec	No Class	
M	2	Sept	7-9	Lab	No Lab	
W	4	Sept	2	Lec	Basic Statistics - Quantifying data	A1 due A2 out
W	4	Sept	5-7	Lab	Basic Statistics using excel	
M	9	Sept	2	Lec	Basic Statistics - CI's, Z-test, t-test	
M	9	Sept	7-9	Lab	Basic Statistics using excel	
W	11	Sept	2	Lec	No Class	
W	11	Sept	5-7	Lab	No Lab	
S	**14**	**Sept**	**2-9**	**Lab**	**Newnan's Lake**	
M	16	Sept	2	Lec	Regression	A2 due A3 out
M	16	Sept	7-9	Lab	Basic Statistics-Regression in excel	
W	18	Sept	2	Lec	Review of Basic stats	Lab 1 out
W	18	Sept	5-7	Lab	Basic Statistics-Regression in excel	
M	23	Sept	2	Lec	Review of Basic stats	A3 due A4 out
M	23	Sept	7-9	Lab	Sampling insect communities	
W	25	Sept	2	Lec	**Exam 1**	
W	25	Sept	5-7	Lab	Sampling insect communities	
M	30	Sept	2	Lec	Quantifying Communities	A4 due Lab 2 out
M	30	Sept	7-9	Lab	Fixed area and Variable area Sampling	
W	2	Oct	2	Lec	Fixed area sampling	
W	2	Oct	5-7	Lab	Fixed area and Variable area Sampling	

M	7	Oct	2	Lec	Variable area sampling	Lab 1 due
M	7	Oct	7-9	Lab	Distance sampling methods	
W	9	Oct	2	Lec	Distance sampling	A5 out
W	9	Oct	5-7	Lab	Distance sampling methods	
M	14	Oct	2	Lec	Distance sampling	
M	14	Oct	7-9	Lab	Line intersect sampling	
W	16	Oct	2	Lec	Line intersect sampling	A 5 due A 6 out
W	16	Oct	5-7	Lab	Line Intersect sampling	
S	**19**	**Oct**	**2-9**	**Lab**	**Cedar Key**	
M	21	Oct	2	Lec	Line transects	
M	21	Oct	7-9	Lab	Line transect sampling	
W	23	Oct	2	Lec	Program distance	A 6 due
W	23	Oct	5-7	Lab	Line transect sampling	
M	28	Oct	2	Lec	Cluster sampling	
M	28	Oct	7-9	Lab	Cluster sampling	
W	30	Oct	2	Lec	Sampling Design	Lab 2 due
W	30	Oct	5-7	Lab	Cluster sampling	
M	4	Nov	2	Lec	Chi-squared	A 7 out
M	4	Nov	7-9	Lab	Leslie Depletion and Mark Recapture	A 8 in Lab
W	6	Nov	2	Lec	Chi-squared	
W	6	Nov	5-7	Lab	Leslie Depletion and Mark Recapture	A 8 in Lab
M	11	Nov	2	Lec	No Lecture	
M	11	Nov	7-9	Lab	No Lab	
W	13	Nov	2	Lec	ANOVA	A 7 due
W	13	Nov	5-7	Lab	Anova and Review	A 9 in Lab
M	18	Nov	2	Lec	ANOVA	
M	18	Nov	7-9	Lab	Anova and Review	A 9 in Lab
W	20	Nov	2	Lec	**Exam 2**	
W	20	Nov	5-7	Lab	Telemetry and Program Mark	
M	25	Nov	2	Lec	Power Analysis	
M	25	Nov	7-9	Lab	Telemetry and Program Mark	
W	27	Nov	2	Lec	No Lecture	
W	27	Nov	5-7	Lab	No Lab	
M	2	Dec	2	Lec	TBD	
M	2	Dec	7-9	Lab	Group Projects	
W	4	Dec	2	Lec	TBD	
W	4	Dec	5-7	Lab	Group Projects	