APPLIED FISHERIES STATISTICS

Fall 2010, FAS 5335C (section 5655)
(also FAS 4932, section 4984)

4 credit hours
Tuesdays and Thursdays: Periods 3-4 (9:35am – 11:30am)
MAEB Room 234

Overview:

Ever wonder what to do with all that data? Too much data? Not enough data? Right kind of data? Maybe you should have thought of that before you ever collected it! The goal of this course is to help you organize your data (past or future) and to learn how to apply many of the statistical tests (that you have learned, should have learned, or will learn) to data collected from aquatic systems, along with learning some new methods of sampling and analysis.

Topics will include mathematical distributions, transforming data, outliers, significant figures, number of samples needed, effect of sampler size, sample design, mark-recapture and depletion methods of estimating abundance, length-frequency analysis, length-weight relationships (K, W_r, ANOCOVA), and basic statistical tests (e.g., t-tests, paired t-tests, tests of normality, correlations, simple ANOVAs, regression analysis). Additional topics will include ratios, pseudo-replication, nonparametric statistics, repeated-measures ANOVA, multiple comparison testing, and variable selection techniques. Handouts (computer printouts and primary literature) will be used extensively as supporting materials. Students will learn the basics of SAS (Statistical Analysis System) programming for data management and analysis.

Grades will be based on weekly/biweekly problems sets, one in-class exam, and class project. Each student will conduct an independent "sampling" project on a fisheries or aquatic science topic of their choice, including review of the literature, proposal and budget preparation, completion of field and/or laboratory work, and preparation of paper and oral presentation based on their research.

Instructor: Dr. Chuck Cichra
Professor / Extension Fisheries Specialist
FAS Graduate Coordinator
University of Florida / IFAS
SFRC - Fisheries & Aquatic Sciences
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Teaching Assistant: Ms. Dana Bigham (Ph.D. student)
Graduate Assistant
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Office Hours: Call or e-mail for an appointment, meet after class, or stop in if our doors are open.

Feel free to call or e-mail questions to either of us.

Directions:

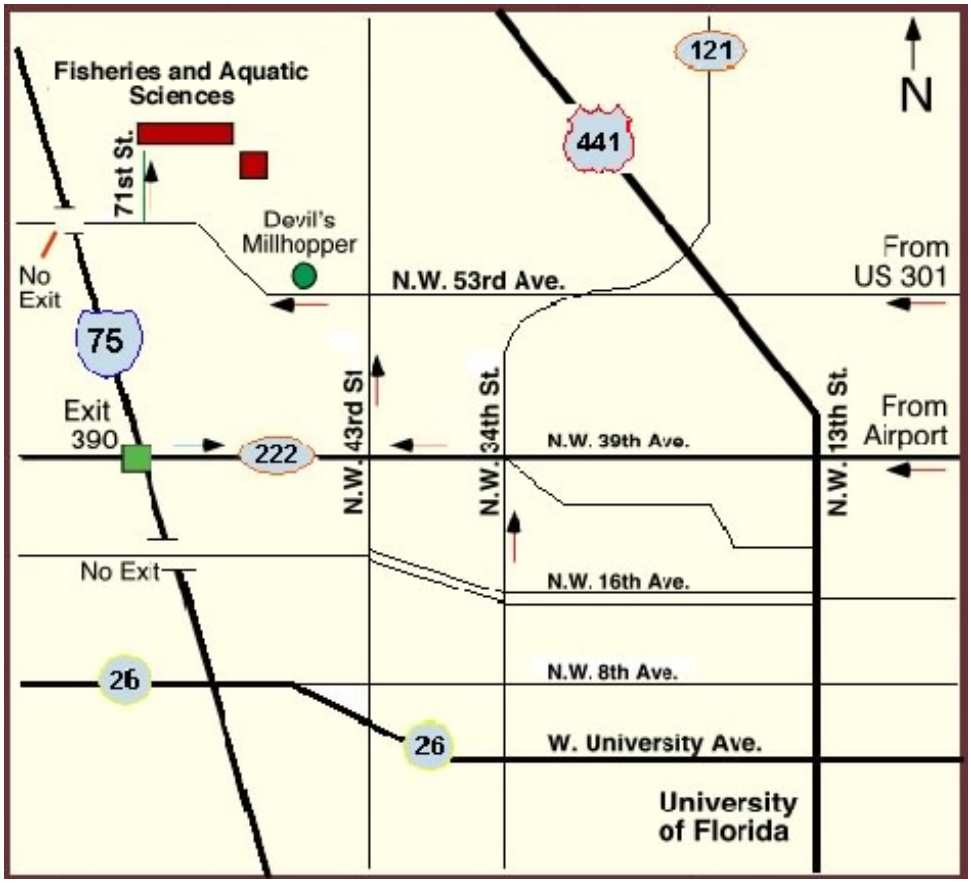
From UF Campus

1) From campus at the corner of W. University Ave. and NW 13th St. (US 441) go north to NW 53rd Ave. (3.5 mi.). Go west past NW 43rd St. and the Devil's Millhopper State Park to NW 71st St. (4.6 mi.). Turn right (north), pass the USGS buildings and go to the end of the paved road (1.1 mi.). Fisheries and Aquatic Sciences and the Center for Aquatic and Invasive Plants' buildings are on right at end of paved road. The Administration Building is the brick building to the east (your right). Our offices are in the longest steel strand building.

2) Alternatively, from W. University Ave., you can take NW 34th St. north to NW 39th Ave. (2.5 mi.). Turn left (west) and go to NW 43rd St. (1 mi.). Turn right. Drive north on NW 43rd St. to NW 53rd Ave. (1 mi.). Turn left (west) and proceed as above.

From Interstate 75

Take Exit 390 at NW 39th Ave. Drive east to NW 43rd St. and proceed as above. There is no exit at NW 53rd Ave.



Grading:

	Points	
Exam	100	In-class
Problem Sets	500	Take-home, generally each week
Class Project	15	Project pre-proposal
	110	Project proposal
	175	Project paper
	100	Final oral presentation
	Total: 1000	

	Grade	Points
Grading Scale	A	900-1000
	B	800-899
	C	700-799
	D	600-699
	E	0-599

Problem sets must be turned in to Dr. Cichra or Dana by the beginning of lecture on the assigned due date.

Project-related work must be turned in to Dr. Cichra, Dana or to the Fisheries and Aquatic Sciences' main office by 5:00 PM on the assigned due date.

10% of the assignment's total value will be deducted per day for any work not turned in on time.

Excused tardiness for course work will be granted if an acceptable excuse if provided. If you know that you will not be in town on due dates, pleases make prior arrangements for turning in assignments (preferably early if possible). Assignments can be faxed or E-mailed.

Schedule: (This may change by Sep 02 with input from the students and TA)

Tuesday		Thursday	
Aug 24	Introduction to course	Aug 26	
Aug 31		Sep 02	
Sep 07		Sep 09	No Class
Sep 14		Sep 16	Pre-proposal due
Sep 21		Sep 23	
Sep 28	No Class (Guest lecturer?)	Sep 30	
Oct 05		Oct 07	Proposal due
Oct 12	Exam (In-Class)	Oct 14	
Oct 19	Guest lecturer (No class?)	Oct 21	
Oct 26		Oct 28	
Nov 02		Nov 04	Guest lecturer(No class?)
Nov 09		Nov 11	No Class – Veterans Day
Nov 16	Guest lecturer (No class?)	Nov 18	
Nov 23		Nov 25	No Class - Thanksgiving
Nov 30		Dec 02	Paper due – No Class?
Dec 07	No Class?		

Guest lecturers may include Dana Bigham, faculty, or staff.

Oral Presentations (held during 'final exam' time?) – to be discussed on Aug 24

Lectures are every Tuesday and Thursday, unless announced otherwise.

Course Topics / Outline:

Organize/Explain Course
- Purpose, instructors, topics, grading, schedule, project, proposal, paper, presentation

Common sampling techniques

Sampling and basic statistics
- Mean, median, mode, standard deviation, variance
- Significant figures
- Sampling designs

Distributions
- Terminology
- Histograms
- Value in sampling
- Mathematical frequency distributions - generation and application
  - Positive binomial
  - Poisson series
  - Negative binomial
  - Normal

Normality
- Tests for normality
- Violation of statistical assumptions
  - What do you do if your data are not normal?
  - Transformations
    - What are transformations?
    - Why do we transform data?
    - Methodologies
    - Common transformations for fisheries and aquatic science data
    - Tests to see if transformations worked
    - If you can't transform, then what?
      - Non-parametric statistics?

Outliers
- What are they?
- Methods to see if you have them (Detection)
- Effects of outliers on analyses
- What do you do with them when detected?

Catch-per-unit-of-effort (CPUE) sampling
- Number of samples
- Size of samples(r)

Mark-recapture techniques
- What is it?
- Why use it?
- Assumptions
  - What happens if you violate them?

How much can you violate them?

- Methodology
  - Biases
  - Calculating confidence limits
  - Sample sizes - allocation of effort (M vs C)

Estimating fish abundance by depletion
- Zippin method

Comparing distributions
- Size distributions
- Age structure
- Chi-square analysis
- Kolmogorov-Smirnov test

Length-weight relationships
- Condition factors (K)
- Relative weights (Wr)
- Methodology
  - Standard weights
  - Length-weight regressions
  - Analysis of covariance

Length-frequency analysis
- Histograms
- Anderson's numerical analyses
  - Proportional stock density (PSD)
  - Relative stock density (RSD)

Empirical modeling
- What is it?
- Why use it?
- An example using regression analysis

Pseudo-replication

Repeated-Measures Analysis of Variance

Ratios in aquatic sciences

Multiple comparison testing

Statistical methods (SAS examples will be used throughout the course)
- T-test
- Paired t-test
- Analysis of variance (1-way, 2-way, interaction, etc.)
- Analysis of covariance
- Correlation analysis
- Regression analysis
- Variable selection techniques (forward, backward, stepwise)

FAS 5335C / FAS4932 - Applied Fisheries Statistics

Project Paper Grading Sheet

Content		POINTS
Abstract	9	_____
Goal of study, objectives, introduction	17	_____
Description of study site & methods	35	_____
Analysis of project data (including project design)	35	_____
Literature review	17	_____
Overall discussion	26	_____
Style		
Readability	7	_____
Follows AFS guidelines	18	_____
Neatness, grammar	11	_____
Total	175	_____

COMMENTS:

Pertinent References:

Anderson, R.O. 1976. Management of small warm water impoundments. Fisheries 1: 5-7, 26-28.

Boyd, C.E. 1979. Water quality in warmwater fish ponds. Auburn University, Auburn Experiment Station, Auburn, Alabama. 359pp.

Carlander, K.D. 1950. Handbook of Freshwater Fishery Biology, Volume One. The Iowa State University Press, Ames, Iowa. 752pp. (Freshwater fishes exclusive of the Perciformes)

Carlander, K.D. 1977. Handbook of Freshwater Fishery Biology, Volume Two. The Iowa State University Press, Ames, Iowa. 431pp. (Centrarchids)

Elliott, J.M. 1971. Some methods for the statistical analysis of samples of benthic invertebrates. Freshwater Biological Association, Scientific Publication No. 25. 148pp.

Hoyer, M.V. and D.E. Canfield, Jr. 1994. Handbook of common freshwater fish in Florida lakes. SP160. University of Florida, Gainesville, Florida. 189pp.

Kohler, C.C. and W.A. Hubert. (Editors) 1993. Inland fisheries management in North America. American Fisheries Society, Bethesda, Maryland. 594pp.

Murphy, B.R. and D.W. Willis. (Editors) 1996. Fisheries Techniques, Second Edition. American Fisheries Society, Bethesda, Maryland. 732pp.

Novinger, G.D. and J.G. Dillard. (Editors) 1978. New approaches to the management of small impoundments. Special Publication No. 5. American Fisheries Society, Bethesda, Maryland. 132pp.

Ricker, W.E. 1968. Methods for assessment of fish production in freshwaters. IBP Handbook No. 3. Blackwell Scientific Publications, Oxford, England. 313pp.

Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Bulletin 191. Fisheries Research Board of Canada, Ottawa, Canada. 382pp.

Seaman, W. (Editor) 1985. Florida aquatic habitat and fishery resources. Florida Chapter, American Fisheries Society, Eustis, Florida. 543pp.

Summerfelt, R.C. and G.E. Hall. (Editors) 1987. Age and growth of fish. The Iowa State University Press, Ames, Iowa. 544pp.

Numerous primary pieces of literature, sample data analyses, computer programs, and reports will be handed out during this course.

Academic Honesty:

As a result of completing the registration form at the University of Florida, every student has signed the following statement: "I understand that the University of Florida expects it students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University."

UF Counseling Services:

Resources are available on-campus for students having personal problems or lacking clear career and academic goals which interfere with their academic performance. These resources include:

1. University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling;
2. Student Mental Health, Student Health Care Center, 392-1171, personal counseling;
3. Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161, sexual assault counseling; and
4. Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

Software Use:

All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.