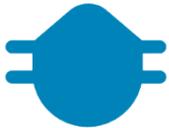


Applied Fisheries Statistics – Fall 2020

FAS 4932 (section 3C24) and FAS 5335C (section 2929)

Fall 2020 Important Information

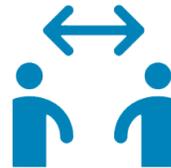
This course will be conducted in a hybrid format that includes some face-to-face sessions. During all face-to-face activities, the following public health and safety protocols are required of all students, instructors, and teaching assistants:



Bring and wear a face mask at all times when indoors.



Wash hands (>20 sec) before and during class.



Maintain at least 6ft of distance from others.



If you feel sick or have symptoms, stay home.

Any individuals who are unable or unwilling to meet [these requirements](#) cannot participate in face-to-face activities and may be subject to progressive discipline. If you are experiencing [COVID-19 symptoms](#) please use the UF Health screening system and follow the instructions on [whether you are able to attend class](#). Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work.

1 Course Overview

Course description:

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, analysis, and presentation.

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), JMP and EXCEL programming for data management and analysis, along with being introduced to R (Hopefully!).

Grades will be based on approximately biweekly problems sets and a 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.

- 4 Credits
- Fall Semester
- Format [blended]: **Synchronous lectures**/discussions will be held via Zoom on Tuesdays and Thursdays: Periods 3-4 (9:35am – 11:30am). The **lab will consist of an independent study** that will be designed and conducted by each student, along with help from the instructor and teaching assistant. Dates and format will depend on the study design.
- This course will be supported by a UF e-learning CANVAS website located at <https://elearning.ufl.edu/>. It will include the course syllabus, PowerPoint presentations, data files, recommended readings, handouts, course assignments, proposal format and budget Excel files, presentation and paper guidelines, and other materials.

Course Prerequisites: none

Instructor:

Dr. Chuck Cichra
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- **Contacting us:** Please use e-mail or text for the fastest response. Dr. Cichra will respond to phone calls, text messages, and e-mails almost 24 – 7!
- **Office hours:** Available by email or phone; office visits available by appointment. Dr. Cichra will try to be available on Zoom before and after each lecture. One-on-one Zoom sessions can be scheduled to go over course content, problem sets, project-related work, or any other topic.

- **Textbook(s) and/or readings:** There is no required text for the course. Online readings will be provided for each learning topic. Some of the readings will be taken from:

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.

Guy, C.S. and M.L. Brown. 2007. Analysis and interpretation of freshwater fisheries data. American Fisheries Society, Bethesda, Maryland. 961pp.

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.

2 Learning Outcomes

By the end of this course, each student will be able to:

- organize and manage data, code data, proof data
- design basic sampling programs, including determining the number of samples needed (power analysis), effect of sampler size and pseudo-replication on results

- use mathematical distributions (positive binomial, negative binomial, Poisson series) to model and determine how “things” are distributed
- transform data, deal with outliers, and present data with the appropriate number of significant figures
- estimate abundance via CPUE, mark-recapture, and depletion methods (Zippin) - including estimating numbers of fish needed (M and C), calculating confidence intervals, assumptions made
- analyze length-frequency data using histograms, K-S test, Chi-square test, PSS (PSD and RSD) analysis
- analyze length-weight relationships (K, W_r , ANOCOVA)
- perform and interpret the results from basic statistical tests (e.g., mean (arithmetic and geometric), standard deviation, variance, standard error, Z scores, CV, t-tests, paired t-tests, tests of normality, correlation analysis, simple ANOVAs, multiple comparisons, regression analysis (including variable selection techniques), Chi-square test, Kolmogorov-Smirnov test, variance to mean ratio test)
- perform basic nonparametric statistics (e.g., Wilcoxon-Mann-Whitney (or rank sum) test, Wilcoxon signed-rank test, Kruskal–Wallis test)
- write and run SAS (Statistical Analysis System) programs for data management and analysis, conduct similar analyses in EXCEL and JMP, and be introduced to other statistical software such as R. (introduced to UF online apps)
- write a proposal, including preparation of a budget
- search and review scientific literature via computer data bases
- design and conduct a ‘scientific study’ in an area of your interest
- communicate the findings of your research, both in written and oral form

3 Course Logistics

Students may access lectures, assignments, readings, and supporting materials through the course Canvas site, as they become available.

Technology Requirements:

- A computer or mobile device with high-speed internet connection.
- A webcam, headset and/or microphone, and speakers.
- Latest version of web browser. Canvas supports only the two most recent versions of any given browser. [What browser am I using?](#)
- Installation of proctoring software may be required and will be provided if so.

Synchronous online sessions will be recorded. By sharing your video, screen, or audio during any synchronous online class sessions, you are consenting to being recorded for the benefit of students who

cannot attend live, as well as for class review during the current semester. If you have special circumstances or concerns about privacy, it is your responsibility to discuss it with your instructor. Dr. Cichra requests that all students use video during the synchronous Zoom lectures, so that he can better interact with students during the sessions.

3.1 Description of Assessments & Activities

To make sure that students understand the course material, approximately 10 problem sets will be assigned during the semester. They will be due a minimum of one week after they are assigned. Each will be worth approximately 50 points, for a total of 500 points.

A major activity and learning experience of this course will be the design and implementation of an independent research project, including the written and oral presentation of the findings. The preproposal, proposal, paper, and oral presentation will be worth 400 points.

Class sessions will be highly interactive in nature, rather than given in a 'lecture' format. It is imperative that students attend each class session. Attendance will therefore count for 100 points. Students will lose 10 points (1% of the total points for the course) for each unexcused missed session.

- Each assignment must be submitted via Canvas by the beginning of lecture on the assigned due date.
- Project-related work (pre-proposal, proposal, and paper) must be submitted via Canvas by 5:00 PM on the assigned due date.
- 10% of the assignment/work's total value will be deducted per day for any item not turned in on time.
- Excused tardiness for course work will be granted if an acceptable excuse is provided.
- If you know ahead of time that you will not be able to meet the due date, please inform Dr. Cichra prior to the due date.

3.2 Grades & Grading Scale

	Points	
Assignments/Problem Sets	500	
Attendance at lectures	100	
Class Project	15	Project pre-proposal
	110	Project proposal
	175	Project paper
	100	Final oral presentation
Total:	<u>1000</u>	

Grading Scale	Grade	Points
	A	931-1000
	A-	900-930
	B+	871-899
	B	831-870
	B-	800-830

C+	771-799
C	731-770
C-	700-730
D+	671-699
D	631-670
D-	600-630
E	0-599

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Graduate students: This course is being co-taught to undergraduate (FAS 4932) and graduate (FAS 5335C) students. Graduate students must do additional work to obtain credit. This will consist of co-teaching one of the lecture topics, including providing appropriate examples and references. Half of the points (50 points), assigned to undergraduate students for attendance, will be assigned to graduate students for this work. Graduate students will coordinate with Dr. Cichra to determine what topics will be used.

4 Learning Content

Date	Day	Topic	Assignments Due
Sep 1	Tuesday	Introduction to course Organization (syllabus) Individual project	
Sep 3	Thursday	SAS programming	PS1 – Who am I?
Sep 8	Tuesday	Sampling methods I and II	
Sep 10	Thursday	SAS programming	PS2 – SAS print program
Sep 15	Tuesday	Distributions – basic statistics	
Sep 17	Thursday	Distributions	PS3 – K, print, subset, plot
Sep 22	Tuesday	Outliers in data Distributions	PS4 – PNPP
Sep 24	Thursday	Discuss projects	Project pre-proposal
Sep 29	Tuesday	Distributions – sampler size, number of samples needed	
Oct 1	Thursday	Transforming data Normality	
Oct 6	Tuesday	Scientific literature searches	
Oct 8	Thursday	Proposal preparation Budgets	PS5 – Transforming data, number of samples
Oct 13	Tuesday	Analyzing data with Excel I	PS6 – Literature
Oct 15	Thursday	Analyzing data with Excel II	
Oct 20	Tuesday	Length-weight relationships K, W_r , W_s , regressions	Project Proposal
Oct 22	Thursday	Length-weight relationships ANOCOVA	PS7 – Excel

Oct 27	Tuesday	Size structure – Length frequency histograms, Chi-Square test, K-S test	
Oct 29	Thursday	Size structure – PSD, RSD, PSS	
Nov 3	Tuesday	Mark-recapture estimates	
Nov 5	Thursday	Mark-recapture estimates	PS8 – Size structure
Nov 10	Tuesday	Zippin depletion estimates	
Nov 12	Thursday	SAS JMP	PS9 – Peterson confidence limits, number of M and C
Nov 17	Tuesday	ANOVA – multiple comparisons	
Nov 19	Thursday	Regression – variable selection techniques	PS10 – Zippin estimates
Nov 24	Tuesday	Sample designs, rounding, significant figures	
Nov 26	Thursday	NO CLASS - Thanksgiving	
Dec 1	Tuesday	Non-parametric methods, pseudoreplication	Project paper
Dec 3	Thursday	Project presentations	
Dec 8	Tuesday	Project presentations	

4.1 Readings

Representative examples:

Anderson, RO and RM Newmann. 1996. Length weight and associated structural indices. Pages 447-481 in: Murphy, BR and DW Willis, editors. Fisheries techniques. 2nd ed. American Fisheries Society, Bethesda, Maryland.

Wege, GJ, and RO Anderson. 1978. Relative weight (W_r): a new index of condition for largemouth bass. Pages 79-91 in: Novinger, GD and JG Dillard, editors. New Approaches to the Management of Small Impoundments. North Central Division, American Fisheries Society, Special Publication Number 5, Bethesda, Maryland.

Willis, DW, BR Murphy, and CS Guy. 1993. Stock density indices: Development, use, and limitations. Reviews in Fisheries Science, 1(3): 203-222.

5 Policies and Requirements

This course plan and syllabus are subject to change in response to student and instructor needs. Any changes will be clearly communicated in advance through Canvas.

5.1 Late Submissions & Make-up Requests

It is the responsibility of the student to access on-line lectures (recorded synchronous Zoom lectures), readings, and assignments, and to maintain satisfactory progress in the course. Requirements for class

attendance and make-up assignments and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Computer or other hardware failures, except failure of the UF e-Learning system, will not excuse students for missing assignments. Any late submissions due to technical issues MUST be accompanied by the ticket number received from the Helpdesk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request consideration.

For computer, software compatibility, or access problems call the HELP DESK phone number—352-392-HELP = 352- 392-4357 (option 2).

5.2 Communication Courtesy and Professionalism

Just as in any professional environment, meaningful and constructive dialogue is expected in this class and requires a degree of mutual respect, willingness to listen, and tolerance of opposing points of view. **Respect for individual differences and alternative viewpoints will be maintained in this class at all times.** All members of the class are expected to follow rules of common courtesy, decency, and civility in all interactions. Failure to do so will not be tolerated and may result in loss of participation points and/or referral to the Dean of Students' Office.

5.3 Semester Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning.

At approximately the mid-point of the semester, the School of Forest Resources & Conservation may request anonymous feedback on student satisfaction on various aspects of this course. These surveys will be sent out through Canvas and are not required but encouraged. This is not the UF Faculty Evaluation!

At the end of the semester, students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

5.4 Academic Honesty Policy

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."*

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes,

exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct or appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated.

Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see:

<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

5.5 Inclusive Learning Environment

This course embraces the University of Florida's Non-Discrimination Policy, which reads,

The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act.

If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see the instructor or refer to the Office of Multicultural & Diversity Affairs website:

<http://multicultural.ufl.edu>.

5.6 Services for Students with Disabilities:

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. 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. 0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

5.7 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.

6 Campus Helping Resources

For issues with technical difficulties for e-learning in Canvas, please post your question to the Technical Help Discussion in your course, or contact the UF Help Desk at:

- Learning-support@ufl.edu | (352) 392-HELP - select option 2 | <http://elearning.ufl.edu>
- Library Help Desk support <http://cms.uflib.ufl.edu/ask>
- SFRC Academic Hub <https://ufl.instructure.com/courses/303721>

6.1 Student Life, Wellness, and Counseling Help

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- Counseling and Wellness resources <http://www.counseling.ufl.edu/cwc/>
- U Matter, We Care <http://www.umatter.ufl.edu/>
- Career Connections Center <http://career.ufl.edu/>
- Other resources are available at <http://www.distance.ufl.edu/getting-help> for online students.

6.2 Student Complaint Process

The School of Forest Resources & Conservation cares about your experience and we will make every effort to address course concerns. We request that all online students complete a course satisfaction survey each semester, which is a time for you to voice your thoughts on how your course is being delivered.

If you have a more urgent concern, your first point of contact should be the SFRC Academic Coordinator or the Graduate/Undergraduate Coordinator for the program offering the course. You may also submit a complaint directly to UF administration:

- Students in online courses: <http://www.distance.ufl.edu/student-complaint-process>
- Students in face-to-face courses: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>