

INTRODUCTION TO FISHERY SCIENCE
FAS 4305C (section 2126) – Spring 2009

OBJECTIVES

The primary objective of this course is to provide students with a basic understanding of fishery science. Knowledge will be gained through classroom lectures and hands-on experience with a broad array of research methods used in fishery science. Research methods will include not only field and laboratory techniques, but also the procedures and formats for data analysis and formulation of management practices for aquatic resources.

Fishery science encompasses a variety of scientific disciplines including physics, chemistry, and biology. Specific items that will be addressed in this course include: (1) structure and function of aquatic habitats, (2) limnological laboratory and field procedures, (3) fish sampling and study methods, (4) analysis and reporting of limnological and fishery data, and (5) an overview of some important Florida aquatic resource issues.

INSTRUCTORS

The course is team-taught to permit students to benefit from the diverse experience of professionals who are working with water quality and fish populations in natural systems.

Faculty: Dr. Daniel E. Canfield, Jr., Professor - Limnology
 Dr. Chuck Cichra, Professor – Fish Ecology and Management

SFRC - Program in Fisheries and Aquatic Sciences
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Office Hours: Teaching assistants (TAs) are available for help by appointment, before and after classes, and by phone and e-mail. Students encountering difficulties with course material or seeking additional information are encouraged to contact the teaching assistants. If the TAs can not resolve the issue or provide the required information, students shall then schedule an appointment with the appropriate faculty member. Remember that faculty have responsibilities in addition to this course; therefore, schedule appointments in advance of when you need the information. **Feel free to talk to us before or after class periods. Also, feel free to contact us by phone or e-mail.**

COURSE WEBSITE

<http://fishweb.ifas.ufl.edu/CourseMaterials/Cichra%20Class/CichraCourse.htm>

SCHEDULE

Lecture: 5th period (11:45 AM to 12:35 PM) on Tuesday and Thursday (3096 McCarty B).

Laboratory: 6-9th periods (12:50 PM to 4:55 PM) on Thursday at Lake Alice, 3096 McCarty B; Room 23 Bldg. 544 (Fisheries); or other designated locations.
(Beginning time may be later depending on location of lab)

REFERENCE TEXTS (There are **no required books** for this course)

Hoyer, M. V., and D. E. Canfield, Jr. 1994. Handbook of Common Freshwater Fish in Florida Lakes. Special Publication 160. University of Florida, Florida Cooperative Extension Service, Gainesville, Florida.

Seaman, W. (ed.) 1985. Florida Aquatic Habitat and Fishery Resources. Florida Chapter of the American Fisheries Society, Gainesville, Florida.

Murphy, B. R., and D. W. Willis 1996. Fisheries Techniques. American Fisheries Society, Bethesda, Maryland.

Wetzel, R. G. 1975. Limnology. W. B. Saunders Company, Philadelphia, Pennsylvania.

Refer to these texts to supplement lecture and lab materials. **Numerous handouts** (journal articles, extension publications, PowerPoint presentations, and data sets) **will be given to students throughout the semester.**

GRADING

First exam	15%	Oral Presentation	10%
Second exam	15%	Lake Alice Paper	25%
Final exam	15%	Laboratory Participation	10%
Assignments	10%		

Grades on items submitted late will be **penalized!!!!**

A: 90-100% B+: 87-89.9% B: 80-86.9% C+: 77-79.9% C: 70-76.9%
D+: 67-69.9% D: 60-66.9% E: < 60%

EXAMINATIONS

The first and second in-class exams will cover only the first and second portions of the course. The final take-home exam will be cumulative. All exams will cover lecture, laboratory, and any assigned reading material. Both short answer and interpretive, essay-type questions will be asked. The TAs will conduct a review session, prior to each of the first two exams, if there is interest by the students that are enrolled in the course.

LABORATORY PROJECT

A field study of the Lake Alice ecosystem will be conducted by teams of students to determine the trophic status of the lake and the current status of the fish community. Students will receive training in select field and laboratory methods and will be provided an opportunity to analyze and interpret real ecological data. Each student will then be responsible for submitting a written report that addresses a specific testable hypothesis (question) that they develop. They report should include both water chemistry and fish data collected from Lake Alice.

The Lake Alice project will include intensive field work. Each student should be prepared for active participation in each field exercise. Dress warmly for cold weather and bring rain suits when appropriate. Field sampling will not be cancelled due to inclement weather, but may be cancelled if thunderstorms are eminent. Because the laboratory will focus around work taking place on water, students are advised to bring a set of dry cloths!

Bring a small notebook for recording your personal field notes. All data should be recorded in pencil.

INTRODUCTION TO FISHERY SCIENCE, FAS 4305C / FAS 4932
Spring 2009

Course Outline (Items may change depending upon class progress)

WEEK	LECTURE TOPICS	LABORATORY WORK
1. Jan 6, 8	Introduction Scientific method Fishery issues	Lake Alice Overview Lab Organization Manuscript Preparation
2. Jan 13, 15	Limnology: properties of water Lake morphometry	Lake Alice (Field)
3. Jan 20, 22	Limnology: light / chemistry cycles Water chemistry	Lake Alice (Field)
4. Jan 27, 29	Sampling fishes Marking and tagging	Lake Alice (Field)
5. Feb 3, 5	Estimation of population size Fish condition factors	Lake Alice (Field)
6. Feb 10, 12	Lake eutrophication	Lake Alice (Field)
7. Feb 17, 19	EXAM I Aquatic plants and eutrophication	Lake Alice (Field)
8. Feb 24, 26	Aquatic plants and eutrophication Age and growth of fish	Lake Alice (Field)
9. Mar 3, 5	Empirical fisheries relationships	Data analysis lab LAKE ALICE PAPER TOPIC DUE
10. Mar 10, 12	SPRING BREAK	No lab
11. Mar 17, 19	Fisheries-plant relationships	Lake Alice (Field)
12. Mar 24, 26	Stream eutrophication and fish	Lake Alice (Field)
13. Mar 31, Apr 2	Fishery management	Data Analysis / Report Writing
14. Apr 7, 9	EXAM II Developing management plans	LAKE ALICE PAPER DUE
15. Apr 14, 16	Tools and strategies	LAKE ALICE ORAL PRESENTATIONS
16. Apr 21, 23	Applications, bias, and confidence Final take-home exam given out	LAKE ALICE ORAL PRESENTATIONS
17. April 28	FINAL EXAM (turn in by 1 PM) (Your exam <u>can</u> be turned in <u>early</u> at Fisheries or at the 4-H Office in 3103 McCarty B – <u>inform</u> Dr. Cichra if you plan to turn it in early)	3096 McCarty B

Lake Alice Project Guidelines

Overview

The teaching team firmly believes that the best education in this introductory course comes about from a combination of theory and practical experience. A recent national report documented the tremendous investment that U.S. business makes annually to retrain college graduates in the more applied part of their new jobs, especially in areas ignored by college courses.

The purpose of the Lake Alice project is to give each student first-hand experience with some of the basic field, laboratory, data analysis, and presentation methods used in the aquatic sciences!

Procedures

Working as teams, students will spend nine weeks in the field, spending each lab period doing a specific task. The five primary tasks are:

- Water sampling and analysis
- Electrofishing
- Gillnetting
- Seining
- Data analysis

Water samples will be analyzed by the students at the SFRC – Program in Fisheries and Aquatic Sciences' chemistry laboratory immediately after the samples are collected. Round-trip transportation will be provided from Lake Alice to Fisheries and then back to Lake Alice as needed.

Fish samples will be processed (measured, weighed, marked and/or tagged), as they are collected, on the shore of Lake Alice. Students must identify (scientific name, common name, and family name) all fish species.

Every student is expected to participate **actively** in the field and lab work (see course grading)! **Students must sign in at each lab period.**

Field-lab measurements and all data are to be recorded by each student team. In certain cases, you will be given a standardized data sheet. All data should be recorded in pencil.

Each team is responsible for carefully recording the data for its particular weekly task. Data from each of the four field tasks will be pooled on a weekly basis. For field fishery data, record sheets **must be given** to the Teaching Assistants or Dr. Cichra before leaving Lake Alice at the end of the lab. This will be the responsibility of the team captains. The water chemistry data sheets will be kept by the water chemistry lab staff. The water and fish data sheets will be consolidated, scanned, and placed onto the course website each week.

Each Wednesday, a different team will assist in the placement of sampling nets into the lake during the late afternoon (approximately 5pm – each week, the time can be adjusted somewhat to accommodate student schedules). If you are unavailable to attend due to a course or work conflict, you must inform the instructors or TAs as to such during lecture on Tuesday.

Project Reporting

We are not collecting data just for the sake of collecting data. While you will gain experience as water and fish samplers, boat operators, etc., another key aspect of the project is that you will become proficient in analyzing, interpreting, and presenting the information you assemble. Data from the course are also being used to provide a long-term ecological assessment of Lake Alice. Past data, from the course, are available on the course website and in hard copy from the instructors.

Note that this applies not only to the "raw data" that you collect from Lake Alice, but also to the body of literature that you are expected to review.

When you are finished, you will have (1) written a research paper in the style of a journal article and (2) orally presented your findings.

Written Report

The paper that you write will be based on the pooled data taken by all teams during the field lab project. Your task is to analyze the data and present your results as if you were preparing a manuscript for a technical journal.

The format of the paper should follow the author guidelines of the North American Journal of Fisheries Management published by the American Fisheries Society. See a recent issue or this journal or its online guide for authors' web site (http://www.fisheries.org/afs/docs/pub_najfm.pdf) for complete instructions.

Your individual paper should include:

- Title
- Author
- Abstract
- Introduction - statement of objective(s)
- Methods
- Results
- Discussion
- Acknowledgements
- References

All these sections shall be typed, double-spaced. **Two copies of your paper must be submitted!**

All the above sections constitute the narrative portion of your paper, and should not exceed 10 pages.

The narrative is followed by these sections:

- Tables
- Figures

Put figure captions on the same sheet as the figures. This is a variance from the standard AFS author guidelines. Be sure headings and legends are complete! Use only 8.5 x 11-inch paper.

It is essential that you review pertinent literature to compare your findings for Lake Alice with other aquatic systems in Florida.

Oral Presentation

Each student will present their project findings to the faculty and TAs in a 15-minute oral presentation (10 minutes of talking and 5 minutes for questions). Details will be announced later in the semester. PowerPoint presentation format is preferred. The TAs can assist you with PowerPoint if you are unfamiliar with using this software.

Help

Where can you go for ideas on doing the best job?

The "Lake Alice Overview and Data Analysis" labs will review the project and presentation guidelines and provide hands-on experience with data management and analysis.

Periodic assignments will provide practice in scientific writing and in data manipulation and interpretation, according to material covered in lectures and in the handouts and reference textbooks.

Resource readings deal not only with methods, but also offer examples of how to organize and write your research paper.

Talk to the instructors and TAs with your ideas and questions!

Grading

A brief description of the tentative topic (hypothesis / question) for your paper is due on **Thursday, March 5, 2009**.

Final typed Lake Alice papers are due at the start of the lecture on **Thursday, April 9, 2009**.

Late papers will be penalized by reducing the paper grade by **10% per working day** for every day it is late.

The written Lake Alice paper is worth 25% of the final course grade.

Oral presentations of your Lake Alice paper will be given on **Thursday, April 16** and **Thursday, April 23, 2009**. **Students will sign up ahead of time for a specific time slot.** Only the instructors and TAs will be present at the presentations.

Participating in the labs for the Lake Alice project and all other periods is worth 10% of the final course grade. Make sure that you sign in or have a valid excuse for missing lab.

If you are unable to meet any of the course deadlines, see the instructors (Drs. Cichra or Canfield) before the scheduled deadline date.

Student's Name: _____

The following guidelines are used to grade the written Lake Alice papers:

Project Report Grading Sheet

For each criterion, assign a point value by circling a number:

	POINTS				
	D-	D-C	C-B	B-A	A+
<u>Criterion Content</u>					
Goal of study	5	7	8	9	10
Description of study site & methods	10	14	16	18	20
Presentation and analysis of project data	10	14	16	18	20
Use and citation of pertinent literature	5	7	8	9	10
Overall discussion	10	14	16	18	20
<u>Style</u>					
Readability	2	3	3	4	4
Follows AFS guidelines	5	7	8	9	10
Neatness, grammar	3	4	4	5	6

COMMENTS:

Total points: _____

Reviewer: _____

Lake Alice Literature Suggestions

The following list identifies articles and reports relevant to Lake Alice, which were located by the class in previous years. To reduce some of your library search time, the titles are provided.

Remember, you also need to go beyond this list to locate other pertinent research articles that discuss the ecology of Florida lakes and fishes. Comparison of your Lake Alice data with other systems is an essential part of the project.

Brezonik, P. L., and E. E. Shannon. 1971. Trophic state of lakes in north central Florida. Pub. IB. Water Resources Research Center, University of Florida, Gainesville, Florida.

Carson, J. H. 1970. Lake Alice--A study of potential pollution of the Aquifer. *Compass* 47:206-210.

Ewel, K. C., and A. Vega. 1981. Waste water effects of a water hyacinth marsh and adjacent impoundment. *Envir. Man.* 5:537-541.

Korhnak, L. V. 1996. Water, phosphorus, nitrogen and chloride budgets for Lake Alice, Florida, and documentation on of the effects of wastewater removal. Masters Thesis. University of Florida, Gainesville, Florida.

Mitsch, W. J. 1975. Systems analysis of nutrient disposal in cypress wetlands and lake systems. Ph.D. Dissertation. University of Florida, Gainesville, Florida.

Mitsch, W. J. 1976. Ecosystem modeling of water hyacinth management in Lake Alice, Florida. *Ecol. Modeling* 2:69-89.

Mitsch, W. J. 1979. Water hyacinth (*Eichhornia crassipes*) nutrient uptake and metabolism in a north central Florida marsh. *Arch. Hydrobiologia.* 81:188-210.

Shannon, E. E. 1970. Eutrophication-trophic state relationships in north and central Florida lakes. Ph.D. Dissertation. University of Florida, Gainesville, Florida.

Academic Honesty

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

Software

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.