

FAS - 6337C Fish Population Dynamics – Fall 2016

Credits: 4 hours

Course Description: Course will demonstrate the analysis of fish population data for management purposes. Methods for estimating fish population parameters (e.g., growth, recruitment, and mortality) will be conducted. You will predict yield and catch composition for recreational and commercial fisheries, and assess effects of harvest restrictions for fisheries management problems. This course is intended for graduate students in SFRC or other natural-resource departments. We will use R and Microsoft Excel in the course.

Objectives and Learning Outcomes: Your objective is to become proficient with tools to conduct basic assessments for recreational and commercial fisheries. Lectures will demonstrate the methods used, and laboratories will provide experience in using the various assessment tools.

At the end of this course you should be proficient in basic parameter estimation and stock assessment of fish populations. You will have experience in data analysis and interpretation, and its use for management. You should be able to analyze data and interpret the results to diagnose overfishing and explore how management policies can improve fisheries.

Instructors:

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Class will meet on Thursday mornings at 10:30 am

Video for lectures and labs ([link](#))

References and Reading List

Walters, C. J., and S. J. D. Martell. 2004. Fisheries management and ecology. Princeton University Press, Princeton, New Jersey.
Haddon, M. 2000. Modelling and Quantitative Methods in Fisheries. Chapman and Hall, London. ISBN 1-58488-177-1

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

Grading System:

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|----------------------|-------------|------|
| Laboratory exercises | 9 @ 8% each | 72% |
| Midterm Exam | | 28% |
| Total | | 100% |

Exams will consist of short-answer questions, definitions, and statistical and mathematical problems.

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|---------------|---|-----|-----|---|-----|-----|---|-----|-----|---|-----|---|----|---|----|---|---|---|-----------|
| Letter | | | | | | | | | | | | | | | | | | | S- |
| Grade | A | A- | B+ | B | B- | C+ | C | C- | D+ | D | D- | E | WF | I | NG | U | | | |
| Grade | | | | | | | | | | | | | | | | | | | |
| Points | 4 | 3.7 | 3.3 | 3 | 2.7 | 2.3 | 2 | 1.7 | 1.3 | 1 | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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Lecture Syllabus

I. Introductory Material

- course goals
- what is a fishery?
- history of fisheries management
- what is a model?

II. Population Growth

- rates of increase (finite versus instantaneous)
- derivation
- models

III. Somatic growth

- age-and-growth estimation techniques
- reporting fish growth
- models of fish length and weight
- condition indices
- comparison of growth rates using linear and nonlinear methods

IV. Mortality

- finite and instantaneous rates
- fishing and natural mortality expression
- conditional mortality rates
- compensatory versus additive mortality
- estimation techniques and confidence intervals

V. Recruitment

- definitions
- estimation
 - stock-recruitment relationships
- environmental factors
- stochastic methods

VI. Population Models

- equilibrium yield model
- incorporating variation in models
- use and misuse of stochastic models

VII. Fish Population Trends

- cycles in fish populations
- effects of density
- abiotic versus biotic influences on abundance

-effects

VIII. Models based on Catch-at-Age

-Virtual Population Analysis

-Statistical Catch-at-Age model

IX. Review and Concluding Topics

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Laboratory Syllabus FALL 2016

Data for all labs can be obtained from the web page or Sakai page. Each laboratory will include a lab report that includes:

1. Your data analysis, including your R program and/or Excel sheet, and
2. Short answers to questions presented for each lab exercise.

Schedule

| <u>Week</u> | <u>Topic</u> |
|-------------|---|
| Aug 22 | Lab overview, introduction to likelihood methods and R (Allen) |
| Aug 29 | Assessment of fish size structure in R (assignment #1) (Allen) |
| Sep 6 | Estimates of fish growth, fitting growth models in R, spotted seatrout (assignment 2, part 1) (Allen) |
| Sep 12 | Continue growth analysis AIC comparison of model parameters (assignment 2, part 2) (Allen) |
| Sep 19 | Total mortality estimation and comparison with ANCOVA in R, black crappie (assignment #3) (Scholten) |
| Sept 26 | Estimating size at maturity and comparison of curves, white grunt (assignment #4) (Allen) |
| Oct 3 | Equilibrium yield per recruit model (assignment #5) (Allen) |
| Oct 10 | Fitting stock-recruitment curves, black crappie and walleye (assignment #6) (Scholten) |
| Oct 17 | Midterm Exam |
| Oct 24 | Stochastic age structured model with biological reference points, spotted seatrout and largemouth bass (assignment #7, part 1) (Allen) |

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|-----------|---|
| Oct 31 | Tagging study to estimate fishing mortality with Monte Carlo uncertainty analysis (assignment #8) (<i>Scholten</i>) |
| Nov 7 | Stochastic age structured models continued (assignment 7, part 2) (<i>Allen</i>) |
| Nov 14 | Virtual Population Analysis, VPA Lake Escanaba walleye and Lake Lochloosa crappie (assignment #9) (<i>Allen</i>) |
| Nov 21-27 | Thanksgiving, no class this week (break 23-26) |
| Nov 28 | Free |
| Dec 7 | Last day of class |

Downloads

For this course you will need several applications. We will work through these in class but please download these applications to your laptop.

<http://www.rstudio.com>

<http://www.r-project.org>

Academic Honesty, Software Use, UF Counseling Services, Services for Students with Disabilities

In 1995 the UF student body enacted and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students.

In adopting this honor code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the university community. Students who enroll at the university commit to holding themselves and their peers to the high standard of honor required by the honor code. Any individual who becomes aware of a violation of the honor code is bound by honor to take corrective action. The quality of a University of Florida education is dependent upon community acceptance and enforcement of the honor code.

The Honor 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.

On all work submitted for credit by students at the university, the following pledge is either required or implied: **"On my honor, I have neither given nor received unauthorized aid in doing this assignment."**

The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff and administrators who practice dishonest or demeaning behavior.

Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean or Student Honor Court.

(Source: 2010-2011 Undergraduate Catalog)

It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor.

This policy will be vigorously upheld at all times in this course.

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.

Campus Helping Resources

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.

University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, ☐

HYPERLINK "http://www.counseling.ufl.edu/cwc/"

☐ www.counseling.ufl.edu/cwc/ ☐

Counseling Services

Groups and Workshops

Outreach and Consultation

Self-Help Library

Training Programs

Community Provider Database

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.

0001 Reid Hall, 352-392-8565, ☐ **HYPERLINK "http://www.dso.ufl.edu/drc/"**

☐ www.dso.ufl.edu/drc/ ☐