

# FAS6337C – FISH POPULATION DYNAMICS

FALL 2021

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 as well as assess effects of harvest restrictions for fisheries management problems. This course is intended for graduate students in SFFGS or other natural-resource departments. We will use R and Microsoft Excel in the course.

## Course Objectives:

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.

## Instructor:

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## Co-instructor:

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## Teaching Assistant:

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**Office Hours:** By appointment only.

## Evaluation:

Your grade will be composed of two components: laboratory assignments and the mid-term exam; there is no final exam.

Component	Number	Part-worth	Note	Total
Laboratory Assignments	10	8%	Lowest dropped	72%
Mid-term Exam	1	28%		28%

**Assignments:** The assignment, data, Excel sheet, and/or R code for all labs can be obtained from the [UF eLearning](#) page. Each laboratory will include a lab report that includes:

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

There is an example lab report in the Assignment #1 module.

With most assignments, there is an interactive component to either assist students in understanding the material or to answer specific assignment questions. Each interactive module (in R Shiny) can be accessed from the Assignment page in [UF eLearning](#) or by navigating to the [interactive welcome module](#).

**Midterm exam:** The midterm exam will consist of conducting the analyses learned from Weeks 1-8 on a simulated fish population and fishery as well as answering short answers. The purpose of the exam is to reinforce your analytical and inference skills generated in the first section of the course.

**Grading Policy:** Please see the [UF grading policy](#) for the assignment of letter grades and GPA.

## Recommended 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.

















## Schedule Overview:

Each week, students can expect to spend time listening to lecture and laboratory analysis materials hosted at [UF eLearning](#); the approximate hours for each is listed below in the weekly schedule breakdown. We will also have a 1–1.5 hour virtual discussion that will be scheduled at the start of the semester by poll sent to students. In addition to the weekly virtual recordings and discussions, students will have an assignment to complete based on that week’s material. Each assignment will typically open at midnight each Monday and close the Wednesday of the following week at 11:59pm; giving students approximately 1.5 weeks per assignment. This is to allow students flexibility in turning in assignments but take care to not fall behind on the material. Students will have a mid-term exam on Week 9 (October 18–22, 2021). Further details will be provided but expect to spend a minimum of 2 days this week on the exam (average is 3 days).

## Schedule Detail:

Below is the lecture, lab, and assignment schedule for each week(s). The various content titles are provided along with the approximate time of the recording, and, in the last column, the difficulty of the material (blue – easy; yellow – moderate; red – hard).

Week	Content	Time		
1	<b>Date: August 23, 2021</b>			
1	Lecture: Introduction to instructors and course	30 m	Blue	
1	Lab: Introduction to parameter estimation	1 h 40 m		
1	Lab: Introduction to R	40 m		
1	Asgmt: Introduce yourself; <b>due: August 28, 2021</b>	15 m		
2	<b>Date: August 30, 2021</b>			
2	Lecture: Growth	30 m	Blue	
2	Lecture: Weight and size structure	35 m		
2	Lecture/Lab: Analyzing size structure	20 m		
2	Lab: Analyzing size structure in R	1h 20 m		
2	Asmgt: Lab 1; <b>due: September 8, 2021</b>			
2				Yellow
3	<b>Date: September 6, 2021</b>			
4	<b>Date: September 13, 2021</b>			
3/4	Lecture: Somatic growth part 1 – growth models	30 m	Blue	
3/4	Lecture: Somatic growth part 2 – Excel example	35 m		
3/4	Lecture: Somatic growth part 3 – estimation challenges	31 m		
3/4	Lab: Analyzing growth in Excel	55 m		
3/4	Lab: Analyzing growth in R	1 h 22 m		
3	Asmgt: Lab 2, part 1; <b>due: September 15, 2021</b>			
4	Asmgt: Lab 2, part 2; <b>due: September 22, 2021</b>			
5	<b>Date: September 20, 2021</b>			
5	Lecture: Mortality part 1 – Terms and conversions	23 m		Yellow
5	Lecture: Mortality part 2 – Catch curve & estimators	37 m		
5	Lecture: Mortality part 3 – Discrete fishery	20 m		

5	Lecture: Mortality part 4 – Continuous fishery	20 m	
5	Lecture: Mortality part 5 – Compensatory mortality	21 m	
5	Lecture: Mortality part 6 – Direct estimation & surrogates	11 m	
5	Lab: Estimating mortality in R	1 h 28 m	
5	Asgmt: Lab 3; <b>due: September 29, 2021</b>		
6	<b>Date: September 27, 2021</b>		
6	Lab: Assessing sexual maturity	1 h	
6	Asgmt: Lab 4; <b>due: October 6, 2021</b>		
7	<b>Date: October 1, 2021*</b>		
7	Lecture: Yield-per-recruit part 1 – CPUE	20 m	
7	Lecture: Yield-per-recruit part 2 – Use of regulations	30 m	
7	Lab Lecture: Introduction to Yield-per-recruit models	13 m	
7	Lab: Yield-per-recruit models in Excel	1 h 20 m	
7	Lab: Conditional formatting in Excel	14 m	
7	Asgmt: Lab 5; <b>due: October 13, 2021</b>		  
8	<b>Date: October 11, 2021</b>		
8	Lecture: Recruitment part 1 – basics and models	42 m	
8	Lecture: Recruitment part 2 – models and challenges	30 m	
8	Lab: Fitting recruitment models	1 h 34 m	
8	Asgmt: Lab 6; <b>due: October 20, 2021</b>		
9	<b>Date: October 18, 2021</b>		
9	Midterm Exam; <b>due October 22, 2021, 11:59 pm</b>		
10/11	<b>Date: October 25, 2021</b>		
10/11	Lecture: Stochastic Yield-per-recruit	42 m	  
10/11	Lab: Stochastic Yield-per-recruit in Excel	1h 3 m	
10/11	Lab: Stochastic Yield-per-recruit in R	1h 5 m	
10/11	Lab Tutorial: Stochastic Yield-per-recruit in R	~ 30 m	
10/11	Asgmt: Lab 7; <b>due November 10, 2021</b>		
12	<b>Date: November 8, 2021</b>		
12	Lecture/Lab: Estimating U (harvest rate)	1 h 3 m	
12	Asgmt: Lab 8; <b>due November 17, 2021</b>		
13	<b>Date: November 15, 2021</b>		
13	Lecture: Virtual Population Analysis	22 m	 
13	Lab: Virtual Population Analysis	1 h 3 m	
13	Asgmt: Lab 9; <b>due: November 25, 2021</b>		
14	<b>Date: November 29, 2021</b>		
14	Lecture/Lab: Angler Effort Dynamics	50 m	
14	Asgmt: Lab 10; <b>due December 8, 2021</b>		

\*Opens early

## Downloads

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

1. [R](#)
2. [RStudio](#)
3. (Optional) [SublimeText](#)
  - a. SublimeText is a free text editor with a lot of functionality for coding in a variety of languages including in R. I personally use SublimeText as my default editor for 95% of my programming. We will use RStudio in the class, as it is the gold-standard for R programming, but I encourage you to check out SublimeText if you find R is to your liking.

**A note on R:** R is an open-source development program and platform. You can easily use others' programs (called packages, we will use several) as well as develop your own. One of the packages you will certainly run into in your R journey is *tidyverse*. This is an ecosystem of packages by a variety of developers originally melded out of a series of packages developed by Hadley Wickham. *Tidyverse* is very popular, especially among data scientists, and is the package most frequently used by the R support groups at UF. We do not use *tidyverse* in this course. Our intention is to teach you the basics of R programming as well as how to write your own functions. We feel this enables you to choose your own route in developing your R skills, whether you continue to develop your own functions or grab off-the-shelf options like *tidyverse*. If you wish to learn *tidyverse* there are a variety of quantitative and R programming courses with SFFGS and IFAS that employ it.

## Attendance Policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Students are expected to attend all weekly discussions. Students who need accommodations for late or missed assignments are expected to request accommodations in a timely manner from the instructor.

## 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 with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center. [Click here to get started with the Disability Resource Center](#). It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

## **Academic Honesty**

Students are encouraged to work with other classmates to understand the course materials and troubleshoot problems with assignments. Each module will have its own discussion board to ask questions of the instructors and of fellow students. However, the assignments and midterm must be completed independently unless explicitly defined as a group project, in writing by the instructor. This policy will be vigorously upheld at all times in this course.

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)

## **Course Evaluations**

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/>.

## **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.

## **Class Recordings**

All group discussions will be recorded and posted on the UF eLearning page for this course and accessible to all students.

***University policy:*** Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

## **Campus Helping Resources**

### ***Health and Wellness***

*U Matter, We Care:* If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or [visit U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.

*Counseling and Wellness Center:* Visit the [Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.

*Student Health Care Center:* Call 352-392-1161 for 24/7 information to help you find the care you need, or visit [the Student Health Care Center website](#).

*University Police Department:* Visit [UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).

*UF Health Shands Emergency Room / Trauma Center:* For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; [Visit the UF Health Emergency Room and Trauma Center website](#).

### ***Academic Resources***

*E-learning technical support:* Contact the [UF Computing Help Desk](#) at 352-392-4357 or via e-mail at [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu).

*Career Connections Center:* Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

*Library Support:* Various ways to receive assistance with respect to using the libraries or finding resources.

*Teaching Center:* Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.

*Writing Studio:* 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

*Student Complaints On-Campus:* [Visit the Student Honor Code and Student Conduct Code webpage for more information](#).

*On-Line Students Complaints:* [View the Distance Learning Student Complaint Process](#).