FAS 6339C

Advanced Quantitative Fisheries Assessment

4 credits Spring 2020

INSTRUCTOR
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Hours: I maintain an open-door policy for students requiring assistance. Distance student can contact me via email to determine the best method for communication (Skype, phone, etc.). Set times for electronic meetings can be established for distance students and will be discussed at the beginning of the term.

COURSE LOCATION & HOURS
Lab Tuesday 4-5 9:35-12:35 McCarty C 426
Lecture Thursday 3-5 9:35-10:25 McCarty B 1108

COURSE DESCRIPTION

"How should scientists operate when they must try to explain the results of history, those inordinately complex events that can occur but once in detailed glory?" -Stephen Jay Gould

Advanced Quantitative Fisheries Assessment is a graduate course offered by the Program in Fisheries and Aquatic Science covering topics related to fisheries stock assessment and management. This course will focus on modern stock assessment models, computational techniques, why these methods work, why they sometimes fail, and how they can be improved and used in evaluating management decisions.

The aim of this course is to provide students with concepts, methods, and tools needed to work effectively as a consultant or government scientist on common problems in applied fisheries assessment. These problems range from the analysis of fish habitat or population status as they relate conservation, environmental management, and ecosystem assessment needed for sustainable harvest management.

The course is organized as two meetings each week, a two-hour lecture/tutorial session on a broad topic then a three-hour lab session to demonstrate specific assessment or gaming methods. All lab sessions are computer-based where students will learn spreadsheet, R, ADMB and other methods for data analysis. Students are expected to have experience with basic fisheries management concepts and calculations and an interest in building computer models to evaluate trade-offs in management decisions.

CREDIT HOURS

This is a 4 credit "C" course, which means there is a lab associated with this course. Two credits of lecture equate to two hours of contact time per week, and one credit of lab throughout the entire semester. We will have 3 hours of lectures per week, and 3 lab hours.

FORMAT

This is a 4-credit course, consisting of instruction in both the classroom and computer lab. We will use the class meeting time for formal instruction including a combination of lecture, discussions, class activities, and computer labs. You are expected to actively participate during classes- expect to be called upon to answer questions, perform calculations, and work on group activities. The computer labs will reinforce and strengthen concepts learned in class through hands-on activities. During the computer lab you will develop assessment or simulation models aimed at providing advice to management (see description of assignments below).

LEARNING OUTCOMES

By the end of the course, students should be able to demonstrate an understanding of the following concepts and techniques:

- Representing state dynamics in both single and multispecies models using various model structures
- Capturing spatial processes in using both spatially explicit and spatially implicit.
- Common problems in developing appropriate observation models and the methods required to meet model assumptions
- Likelihood and Bayesian methods for evaluating model credibility and parameter uncertainty
- Methods for forecasting and evaluating risk of management options
- Developing simulations to evaluate management strategies.
- Identify potential problems with data sets.
- Identify appropriate state dynamics model, observation model, and statistical methods for evaluating population or ecosystem attributes of interest.
- Develop computer code to perform these evaluations and present the results in an appropriate manner.

COURSE ESSENTIAL QUESTIONS & OBJECTIVES

1. What is the current state of global and local fisheries and why we manage fisheries?
    a. Develop and understanding of the polarized debate over the status of fisheries around the world.
    b. Develop and understanding of the role that fisheries assessment plays in the management of fisheries.
2. What fundamental ecological principles that allow for sustainable harvest?
    a. Develop an understanding of the processes that lead to compensatory responses in natural population and how these processes are represented in mathematical models.
3. What are the underlying biological principles and statistical challenges related to developing stock-recruitment relationships?
    a. Develop an appreciation for the scale at which density-dependent interaction occur.

   b. Develop and understanding of the statistical challenges faced when developing recruitment curves: error-in-variable, time series bias, and multiplicative error structure.
4. How is natural mortality estimated?
   a. Understand how to derive mortality estimates for meta-analyses.
   b. Understand how natural mortality can be estimated from mark-recapture data.
5. What are the fundamental approaches to estimating natural population abundance?
   a. To be able to identify when specific methods are appropriate for estimating population abundance.
   b. To identify what abundance estimation methods are generally used in stock assessment.
6. What information can be extracted from specific data sources and what assumptions must be made to extract certain information form specific data sources.
   a. Develop and understanding of how specific population level phenomenon appear in data streams such as composition information and relative abundance trends.
7. What strategies and tactics are appropriate to meet management objectives?
8. What are the socio-economic drivers that influence fishing effort in bot h commercial and recreational fisheries?
9. How do we address spatial issues in fisheries assessment?

REQUIRED MATERIALS

Much of the lab work done in FAS 6339C is conducted on computers. All participants are expected to have access to a computer that they can bring to lab sessions. Computers are expected to have a version of Microsoft Excel with Solver installed, a text editor with syntax highlighting, the R statistical software (*www.**r**-project.org*), Ecopath with Ecosim 6 (*www.ecopath.org*), and AD model builder (*admb-project.org*).

Text editors: R-studio http://www.r-studio.com/, Sublime www.sublimetext.com/, Emacs

You should also bring a laptop to each class. There is no required text for the course. Below are a number of suggested information sources. Additional readings will be provided on the course Canvas site.

Hilborn, R and C J Walters 1992. Quantitative fisheries stock assessment. ISBN 0412022710
Walters, C. J. 2001. Adaptive management of renewable resources. ISBN1930665431
Walters C.J. and S. J. D. Martell 2004. Fisheries Ecology and Management. ISBN 0691115451

All participants are encouraged to read Hilborn R. and M. Mangle 1997 The Ecological Detective. ISBN 0691034974.

ELECTRONIC COMMUNICATIONS

Course materials will be available through the Sakai e-learning site. You will find a link for handouts (syllabus, assignments, lab data) and for all presentations. Presentations may not be available prior to class and it is your responsibility to take notes. On occasion, an email will be sent to your UF email address regarding updates to the syllabus, clarifications of assignments, or changes in due dates. If you aren't doing so already, you should be checking your UF email on a

regular basis. Assignment and final projects for individuals taking the class on campus are to be handed in during class times at any time before or on the date they are due. Individuals taking the class via distance can turn assignment in via email to the instructor before or on the day they are due.

EVALUATION AND PERFORMANCE CRITERIA

Evaluation Method	**Points / % of total**	
Assignments	800 pts	80%
Exam	200 pts	20%

Letter grades will be assigned as follows:

A (100-90), B+ (89-85), B (84-80), C+(79-75), C (74-70), D (69-60), E (<60)
A complete explanation of the UF Grading policies can be found at http://www.registrar.ufl.edu/

At the very minimum, the student is expected to attend class, complete all assignments on time, and actively participate during class discussions. Students who complete the minimum requirements (i.e., just answering the assignment questions asked) should not expect to receive and A in the class. Student wishing to receive, and A should go beyond the minimum required questions. Excuses for late work and absences—Assignments turned in on paper at the start of the class period or by 5 pm are considered on time. After that, late assignments will lose value at the rate of 10% for the first late day and 5% for each subsequent late day. Arrangements to hand in assignments late due to conflicts with absence due to field work and conferences must be made prior to the assignment due date. Failure to make arrangement will result in lost marks.

Assignments
Assignments will generally consist of exploring some aspect of population/ecosystem assessment. There will be 8 assignments over the course of the term. Assignments will generally follow the material presented in class. You will be required to submit a summary report of your findings. Students expecting an A are expected to go beyond the basic questions you are asked to explore and provide a broader analysis of the topic explored. Assignment reports are expected to be in a specific format and an example of which can be found on the Canvas site.

Exam
The online exam is intended to test your knowledge of basic equation used to represent fisheries and the species that they target as well as basic terminology used in stock assessment.

ONLINE COURSE EVALUATION PROCESS

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific

times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

ACADEMIC HONESTY

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 to 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.

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.

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/**

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,* **www.counseling.ufl.edu/cwc/**

Counseling Services
Groups and Workshops
Outreach and Consultation
Self-Help Library
Wellness Coaching

- *Career Resource Center,* First Floor JWRU, 392-1601, **www.crc.ufl.edu/**

DISTANCE STUDENTS

Should you have any complaints with your experience in this course please visit http://www.distance.ufl.edu/student-complaints to submit a complaint.