

FAS 6932: Reproductive Dynamics of Fish in Fisheries (Summer B 2022)

Instructor Dr. Debra J. Murie

Main Office Program of Fisheries and Aquatic Sciences, School of Forest,
Fisheries and Geomatics Sciences, 7922 NW 71st Street, Gainesville

Office Hours Please email me with your questions or concerns and I will respond within 24 hrs at the latest. Many times I will be able to respond to your emails quicker, except when I am in the field.

Telephone (352) 273-3601: My phone at Fisheries is equipped with Voice IP so if you leave a message then I should receive it as an email notification and I will respond within 24 hrs.

E-mail dmurie@ufl.edu

Course Description

Offered in the Summer B semester of even years for 2 credits. The course is 100% online and asynchronous through <http://elearning.ufl.edu>.

Course covers reproductive biology and ecology of fishes in relation to fisheries and fisheries management, including: reproductive modes and cycles, gonad development and staging, spawning duration and season, fecundity, sexual maturity, spawning aggregations, and spatial and temporal variation in reproductive dynamics.

The course format includes lectures, discussion of primary literature articles, and homework exercises that include analysis of reproductive parameters, such as sexual maturity and fecundity.

Prerequisites

Course in fish biology (e.g., Biology of Fishes or equivalent) and statistics (STA 2023 or higher); students should be familiar with the basic use of Excel but do not need to know how to use SAS or r (program outputs will be provided in those cases).

Learning Outcomes

On completion of this course, each student will be able to:

- Discuss and explain central concepts in fish reproductive biology and ecology relevant to fisheries and fisheries management

FAS 6932: Reproductive Dynamics of Fish and Fisheries

- Critically evaluate the primary literature on reproduction of fishes
- Apply metrics and models of reproductive dynamics used in fisheries

Course Communication

Course information will be posted on our Canvas site and allow you day-to-day access to lecture modules, the discussion board, assignments, and grades. All due dates will be posted on our Canvas site. Information on how to use the Canvas site can be accessed at: <http://elearning.ufl.edu/>

Course Schedule and Format

This course consists of six modules with associated activities detailed below. An individual module will open on Monday, runs throughout the week, and closes on following Monday when the next module opens. Please see individual modules for opening times on our Canvas site. All times are Eastern Time (Florida).

Please note: The modules have a weekly schedule of completion so that everyone progresses through the course sequentially and everyone is able to contribute significantly to the group discussions. To facilitate this, the open-book lecture quiz must be completed prior to starting an assigned discussion or homework exercise. Please plan your schedule accordingly (i.e., it is not a “progress-at-your-own-pace” course).

Each module has one or more narrated PowerPoint lectures in combination with: 1) open-book quizzes, 2) group discussions of a journal article posted to an online discussion board; or 3) a homework exercise applying the methods and metrics discussed in the lectures. There are no formal cumulative exams in this course.

Lecture quizzes (open book):

Quizzes for each lecture are open book and are designed to ensure that the lecture material is read and absorbed before the group discussions or homework exercises are due. Lecture quizzes must be completed before either the group discussion or the homework exercise will open. In this way, everyone in the course will have gone through the lecture and can contribute to the group discussions. There will be 6 open-book lecture quizzes of 10 points each, which will be 25% of the final grade.

Group Discussions:

A selected journal article from the primary, peer-reviewed literature will be posted to our Canvas site and will act as a focal point for a group discussion on our online bulletin board. Each student is expected to participate fully by contributing to the ongoing discussion board a minimum of four times during the open comment period (i.e., not just in the last few hours of the discussion board). Your grade for each group discussion will be based on the level of your contribution to the discussion thread, with quality preferred over quantity of postings. For

FAS 6932: Reproductive Dynamics of Fish and Fisheries

example, responding to a point posted by another student or starting a new thread of questioning will facilitate the discussion, but re-stating the exact same point that another student has already posted will not add to the discussion. I will periodically be injecting points as well to move the discussion forward. There will be 3 discussion threads worth 10 points each, which will be 25% of the final grade.

Homework Exercises:

Several modules will have homework exercises associated with them that require calculations and interpretation of data. Students will work through the exercises independently and upload their responses online as a written document, usually with an accompanying excel file (or r document). There will be 3 homework exercises worth 20 points each, which will be 50% of the final grade.

Changes to the Course and Syllabus

The Instructor reserves the right to make changes to the course, schedule, and syllabus. If any changes occur, students will be informed through a Canvas announcement, and a revised syllabus will be posted.

Recommended Text

There is no required text for the course. Online readings will be provided for each learning topic, and the group discussions online will be based on papers from the primary literature.

Course Grading

Assignments

Activity	#Assignments	Points/Activity	Total Points	% Final Grade
Lecture Open-book Quizzes	6	10	60	25
Group Discussions	3	10	30	25
Homework Exercises	3	20	60	50
TOTAL			150	100

Grading Point Ranges

A (93-100%), A- (90-92.99%), B+ (86-89.99%), B (82-85.99%), B- (78-81.99%), C+ (74-77.99%), C (67-73.99%), C- (63-66.99%), D+ (59-62.99%), D (55-58.99%), D- (51-54.99%), E (<51%).

FAS 6932: Reproductive Dynamics of Fish and Fisheries

Late Assignments & Make-Up Requests

Homework assignments that are posted to our Canvas site later than the due date and time will be decreased by 10% per day (any portion of 24 hr after the due date/time, and thereafter). **Please note:** The group discussion bulletin board will close on the due date and time, and therefore no additions can be made after it closes since it is a group activity. If you have a legitimate reason (e.g., jury duty, etc.) for having a late assignment then please contact me before it is due so that we can work out an alternative arrangement.

Requirements for make-up quizzes, 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).

Netiquette: Communication Courtesy

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. Failure to do so may result in referral to the Dean of Students Office.

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>.

FAS 6932: Reproductive Dynamics of Fish and Fisheries

Services for Students with Disabilities

The Disability Resource Center (0001 Reid Hall, 352-392-8565, <http://www.disability.ufl.edu>) 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.

It is important for a student to share their accommodation letter with their instructor and discuss their access needs as early as possible in the semester. Accommodations are not retroactive and you must therefore submit the documentation letter prior to submitting assignments or scheduling exams. Students should therefore contact the office as soon as possible in the term for which they are seeking accommodations.

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>

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 this course (e.g., homework, quizzes) unless the instructor provides explicit permission for you to collaborate on course tasks (e.g., discussions). 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

FAS 6932: Reproductive Dynamics of Fish and Fisheries

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 and 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>.

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 and academic goals which interfere with their academic performance. These resources include:

Health and Wellness

- *U Matter, We Care*: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or <http://www.umatter.ufl.edu> to refer or report a concern and a team member will reach out to the student in distress.
- Counseling and Wellness resources: visit <http://www.counseling.ufl.edu/cwc/> 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.
- University Police Department: 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 SE Archer Road, Gainesville, FL.
- Other resources are available at <http://www.distance.ufl.edu/getting-help> for online students.

Academic Resources

- Career Connections Center: Reitz Union, Suite 1300, 352-392-1601. Career assistance and counseling services <http://career.ufl.edu/>
- Other resources are available at <http://www.distance.ufl.edu/getting-help> for online students

FAS 6932: Reproductive Dynamics of Fish and Fisheries

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:

- E-learning technical support: helpdesk@ufl.edu | (352) 392-4357 - select option 2 | <http://elearning.ufl.edu>
- Library Help Desk support <http://cms.uflib.ufl.edu/ask>
- SFFGS Academic Hub <https://ufl.instructure.com/courses/303721>

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.

Intellectual and Viewpoint Diversity Act (House Bill 233) and recording of class lectures

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

FAS 6932: Reproductive Dynamics of Fish and Fisheries

a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Policies regarding student in-class recordings are detailed here <http://aa.ufl.edu/policies/in-class-recording/>.

Student Complaint Process

The School of Forest, Fisheries & Geomatics Sciences cares about your course experience and we will make every effort to address course concerns. Your first point of contact should be the Academic Coordinator or the Graduate Coordinator for the program offering the course. You may also submit a complaint directly to UF administration:

- <https://distance.ufl.edu/getting-help/>
- <https://registrar.ufl.edu/complaint.html>

FAS 6932: Reproductive Dynamics of Fish and Fisheries

Schedule

Module	Open Date	Topic
1	27 June	Introduction to course; diversity and morphology of the reproductive systems; reproductive modes and cycles
2	4 July	Developmental phases of ovaries and testes based on macro- and histological staging
3	11 July	Spawning periodicity and seasonality; skipped spawning; spawning aggregations
4	18 July	Fecundity; Lifetime reproductive output
5	25 Aug	Sexual maturity; Female condition and bioenergetics
6	1 Aug	Spatial and temporal variations in reproductive dynamics

Reading Resources

- Anderson, K.H., N.S. Jacobsen, P. D. van Denderen. 2019. Limited impact of big fish mothers for population replenishment. *Canadian Journal of Fisheries and Aquatic Sciences* 76(3): 347-349.
- Berkeley, S.A., C. Chapman, and S.M. Sogard. 2004. Maternal age as a determinant of larval growth and survival in a marine fish, *Sebastes melanops*. *Ecology* 85: 1258-1264.
- Bobko, S.J., and S.A. Berkeley. 2004. Maturity, ovarian cycle, fecundity, and age-specific parturition of black rockfish (*Sebastes melanops*). *Fishery Bulletin* 102: 418-429.
- Brown-Peterson, N.J., D.M. Wyanski, F. Saborido-Rey, B.J. Macewicz, and S.K. Lowerre-Barbieri. 2011. A standardized terminology for describing reproductive development in fishes. *Marine and Coastal Fisheries* 3: 52-70. 23
- Calduch-Verdiell, N., B.R. MacKenzie, J.W. Vaupel, K.H. Andersen. 2014. A life-history evaluation of the impact of maternal effects on recruitment and fisheries reference points. *Canadian Journal of Fisheries and Aquatic Sciences* 71(7): 1113-1120.
- Claramut, G., R. Serra, L.R. Castro, and L. Cubillos. 2007. Is the spawning frequency dependent on female size? Empirical evidence in *Sardinops sagax* and *Engraulis ringens* off northern Chile. *Fisheries Research* 85: 248-257.
- Eldridge, M.B., J.A. Whipple, M.J. Bowers, B.M. Jarvis, and J. Gold. 1991. Reproductive performance of yellowtail rockfish, *Sebastes flavidus*. *Environmental Biology of Fishes* 30: 91-102.
- Fitzhugh, G.R., K.W. Shertzer, G.T. Kellison, and D.M. Wyanski. 2011. Review of size- and age-dependence in batch spawning: implications for stock assessment of fish species exhibiting indeterminate fecundity. *Fisheries Bulletin* 110: 413-425.

FAS 6932: Reproductive Dynamics of Fish and Fisheries

- Hislop, J.R.G. 1988. The influence of maternal length and age on the size and weight of the eggs and the relative fecundity of the haddock, *Melanogrammus aeglefinus*, in British waters. *Journal of Fish Biology* 32: 923-930.
- Hixon, M.A., D.W. Johnson, and S.M. Sogard. 2013. BOFFFFs: on the importance of conserving old-growth age structure in fishery populations. *ICES Journal of Marine Science*, doi:10.1093/icesjms/fst200.
- Hunter, J. R., and B. J. Macewicz. 1985. Measurement of spawning frequency in multiple spawning fishes. Pages 79–94 in R. Lasker, editor. An egg production method for estimating spawning biomass of pelagic fish: an application to the northern anchovy, *Engraulis mordax*. NOAA/NMFS Technical Report 36.
- Larson, R.J. 1991. Seasonal cycles of reserves in relation to reproduction in *Sebastes*. *Environmental Biology of Fishes* 30: 57-70.
- Lowerre-Barbieri, S.K., K. Ganas, F. Saborido-Rey, H. Murua, and J.R. Hunter. 2011. Reproductive timing in marine fishes: Variability, temporal scales, and methods. *Marine and Coastal Fisheries* 3: 71-91.
- McBride, R. S., Somarakis, S., Fitzhugh, G. R., Albert, A., Yaragina, N. A., Wuenschel, M. J., Alonso-Fernandez, A., and G. Balisone. 2013. Energy acquisition and allocation to egg production in relation to fish reproductive strategies. *Fish and Fisheries*. doi: 10.1111/faf.12043.
- Murua, H., G. Kraus, F. Saborido-Rey, A. Thorsen, P. Witthames, and S. Junquera. 2003. Procedures to estimate fecundity of wild collected marine fish in relation to reproductive strategy. *Journal of Northwest Atlantic Fishery Science* 33: 33-54.
- O'Farrell, M., and L. W. Botsford. 2006. The fisheries management implications of maternal-age-dependent larval survival. *Canadian Journal of Fisheries and Aquatic Sciences* 63:2249-2258.
- Smith, G.H., D.J. Murie, and D.C. Parkyn. 2014. Nonlethal sex determination of the greater amberjack, with direct application to sex ratio analysis of the Gulf of Mexico stock. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science* 6: 200-210.
- Sogard, S.M., S.A. Berkeley, and R. Fisher. 2008. Maternal effects in rockfishes *Sebastes* spp.: a comparison among species. *Marine Ecology Progress Series* 360:227-236.
- Spencer, P.D., S.B.M. Kraak, and E.A. Trippel. 2014. The influence of maternal effects in larval survival on fishery harvest reference points for two life-history patterns. *Canadian Journal of Fisheries and Aquatic Sciences* 7(1): 151-161.
- Vallin, L. and A. Nissling. 2000. Maternal effects on egg size and egg buoyancy of Baltic cod, *Gadus morhua*: Implications for stock structure effects on recruitment. *Fisheries Research* 9: 21-37.
- Venturelli, P.A., B.J. Shuter, and C.A. Murphy. 2009. Evidence for harvest-induced maternal influences on the reproductive rates of fish populations. *Proceedings of the Royal Society B* 276: 919-924.