Introduction to Applied Fisheries Genetics (FAS6932)

Fall 2016 (2 credits)

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Office hours:	TBA Office hours will be conducted on the e-learning Canvas system. Students can contact the instructors using the *Chat Room* tool.
Prerequisites:	Undergraduate class in genetics and evolution is recommended; WIS3553C, or equivalent; permission of coordinating instructor.
Course description:	Are you interested in gaining a basic understanding of the role of genetics in fisheries research and management? This course is oriented toward fisheries biologists, fisheries decision-makers, professionals in the aquaculture industry, and students whose goals are to working in fisheries-related professional fields. The course will provide a broad topical overview of genetic/genomic aspects of fisheries management and fisheries-related topics.
Course overview:	This course is designed to provide an introduction and overview of current genetic and genomic topics in the context of fisheries management and conservation. The course will cover basic population genetic and evolutionary principles that determine genetic variation in both natural and artificial environments (captivity/hatcheries), and explore the genetic basis for physical traits (quantitative genetics). By drawing heavily on examples from current literature, this class will provide students with an introduction to the theoretical background and practical applications of genetics/genomics for a wide range of diverse fisheries genetics topics.
General course information:	The course is provided in an online format and will follow a "flipped" style (i.e., students will be provided with material (readings, written summaries) that they will be required to prepare in advance). We will meet for one 2-hour session per week, each typically consisting of an initial interactive discussion on topics assigned the week prior, followed by an introductory lecture for the following week's topic. Student's grades will be determined by their participation and effort in synthesizing assigned readings, and an individual research report and presentation that will be provided to the class.
Learning objectives:	After completion of this course students will be able to: 1) Understand and communicate the basic principles of molecular genetics in the context of fisheries science 2) Understand the applications and limitations of molecular tools for addressing fisheries research, conservation, and management needs

Grading:

Grades in this course will be based on weekly reading assignments, online quizzes, and individual student projects.

200 points - Weekly reading assignments/problem sets
100 points - Review paper
100 points - Teaching presentation

Grading scale: A – 360-400 points; B – 320-359 points; C – 280 – 319 points; D – 240-279

Assigned readings will be provided at the start of the course, and students will be expected to carefully read and prepare for a discussion on the topic during the first half of the class meeting. A ½ to 1 page (single spaced) synopsis of the assigned reading(s) will be due prior to the start of class.

A review paper (5-10 pages double spaced) on a topic based either on one of the provided "suggested readings" (TBA) or on a fisheries genetics topic of your choosing, with the permission of the instructor. Detailed instructions and grading rubric will be provided before the start of the course.

Students will prepare a 15-20 minute PowerPoint presentation on the same topic. The PowerPoint will include a voice narrative. Detailed instructions and grading rubric will be provided at the start of the course.

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.
0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Course evaluations:

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.

Each online distance learning program has a process for, and will make every attempt to resolve, student complaints within its academic and administrative departments at the program level. See http://distance.ufl.edu/student-complaints for more details.

Plagiarism:

Plagiarism is a serious violation of the Student Honor Code. The Honor Code prohibits and defines plagiarism as follows: Plagiarism. A student shall not represent as the student's own work all or any portion of the work of another. Plagiarism includes (but is not limited to):

a. Quoting oral or written materials, whether published or unpublished, without proper attribution.
b. Submitting a document or assignment which in whole or in part is identical or substantially identical to a document or assignment not authored by the student. (University of Florida, Student Honor Code, 15 Aug. 2007 <http://www.dso.ufl.edu/judicial/honorcode.php>)

Student honor code:	University of Florida students are responsible for reading, understanding, and abiding by the entire Student Honor Code (http://www.dso.ufl.edu/sccr/honorcode.php).

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Topical schedule

Aug 22-26	1)	Introduction • Understanding the importance of genetics for fisheries biologists and managers • History of fisheries genetics • Basic genetic terms and definitions
Aug 29-Sep 2	2)	Evolution of fishes • Phylogenetic trees and their interpretation • Major events in fish evolution • Patterns across marine and freshwater systems
Sep 5-9	3)	Population genetics • Measuring variation with genetic markers • The importance of random mating (i.e. Hardy Weinberg Equilibrium) • Non-random mating: inbreeding and assortative mating • Evolutionary forces: mutation, migration, selection, genetic drift • Effective population size
Sep 12 -16	4)	Population genetics/genomics applied to fish stocks • Stock Identification • Resolving mixed-stock fisheries
Sep 19-23	5)	Gene tagging and stock size estimation • Genetic mark-recapture • Estimating the number of breeding adults
Sep 26-30	6)	DNA barcoding applications • Identifying an unknown sample to species • Quantifying trophic ecology
Oct 3-7	7)	Quantitative genetics • Mendelian basis of quantitative traits • Epistasis, dominance, additivity • Heritability • Quantitative trait mapping
Oct 10-14	8)	Quantitative genetics • Artificial selection • Breeding values • Causes and consequences of selection • Potential impacts of stocking on native populations
Oct 17-21	9)	Determining evolutionary adaptation in fish • Local adaptation • Significance to fisheries management
Oct 31-Nov 4	10)	Connectivity and marine reserves • Quantifying connectivity • Factors influencing genetic connectivity and reserve design
Nov 7-11	11)	Invasive fish species • Genetic paradox • Factors influencing success • Reconstructing invasion routes • Adaptations in invading populations
Nov 14-18	12)	Harvest-induced selection • Demographic and genetic consequences of harvest • Conditions under which stocks can respond and how phenotypic changes occur
Nov28- Dec 2	13)	Conservation genetics • “Distinct population segments” as applied to fisheries • Maintenance of evolutionary potential
Dec 5 –Dec 7	14)	Student presentations