Course Syllabus

Introduction to Conservation Genetics (WIS 3553C)

Spring 2024

Instructor: Professor James Austin

T.A.: Ms. Kyra English

Lectures: Wednesday & Friday (period 5 – 11:45-12:35) Matherly Hall (MAT) G0018

Lecture/lab Monday (08D1 – 11:45-1:40; 08D2 – 9:35-11:30) McCarty Hall B (MCCB) 3086

Textbook: None required. Your assigned readings will be linked within each Module.

Office hours: Dr. Austin's office hours will be held on Wednesday & Friday from 1:00 to 3:00 in NZ 314. Ms. English will hold office hours on Friday after class, 1:00-2:30 in NZ 203 (next to the elevator).

Course Description:

One of the most significant unmet issues in conservation biology is the genetic management of fragmented animal and plant populations. Most species across the planet now have fragmented distributions, with many small, isolated populations potentially suffering from inbreeding, loss of genetic diversity, and elevated extinction risk.

This course provides Wildlife Ecology and Conservation students with a conceptual overview of basic population genetics and a practical understanding of how we utilize genetics to manage wildlife.

This course is designed for Wildlife Ecology and Conservation majors. The class is open to non-majors, but please understand that the course is not sufficient as a genetics course for aspiring veterinarians. This course is a prerequisite for Conservation Biology (WIS 4501 and WIS 4554).

The course is conducted synchronously and in person. PDFs of the lecture slides will be available before each meeting, and readings will be assigned beforehand.

Course structure

Attendance is mandatory but graded indirectly through in-class participation. Participation will include in-class questions posed using electronic surveys (Poll Everywhere, see below) and by taking ungraded quizzes outside of class and other participation 'assignments' that will be indicated in Canvas throughout the term. Un-graded in-class attendance will be done via sign-in sheets. Participation marks will only be

excused for UF-justified absences. Except for a sudden illness, I expect prior notice of missed classes. Read the UF absence policy here: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/.

Appointments are not required but recommended. Please let me know when you will be stopping by in class. Other than set office hours, I will typically be in this office much of the day on Wednesday and Friday. Drop-ins are welcome. (My other office is across campus, where I work Tuesdays and Thursdays during spring term. You can make an appointment to see me there as well.)

Course goal:

Wildlife managers and conservation biologists are increasingly faced with issues associated with habitat fragmentation and the resultant impacts on wildlife. One of the major implications of anthropogenic fragmentation is that populations become isolated, decrease in size, and suffer from many genetic consequences. Whether to maintain genetic isolation is a significant issue for managers of wild animal and plant populations. Practitioners must be aware of the problems relating to restoring genetic diversity and reversing genetic deterioration associated with small population size.

The overarching goal of this course is to provide students with the ability to identify and prioritize wildlife populations in need of genetic management. Upon completion of this course, students will 1) have demonstrated their ability to diagnose genetic issues associated with small fragmented animal and plant populations and 2) make and communicate management recommendations based upon genetic data and sound management principles on a case-by-case basis.

The core learning objectives for students completing this course are:

- Students will be able to recall and apply the basics of population genetic theory to explain the genetic impacts of small population size.
- Describe how genetic variation arises and why variation is essential for organisms to adapt.
- Basic efficiency using R and RStudio as tools for exploring genetic data.
- Given various examples, students will use decision tree approaches to make genetic management recommendations.

Specific learning objectives will accompany each module and day's lesson. These will be identified in eLearning.

Course prerequisites:

Introduction to Statistics (STA 2023) and one of the introductory ecology courses (WIS3404, PCB 3601C, PCB 4043C, or FOR 3153C). Requests for waivers on prerequisites are generally denied.

These prerequisites are set for the following reasons: What you will be mastering requires a basic understanding of statistics (means, variance, interpreting statistical significance), and much of what we are going to be learning about relates to organismal ecology (e.g., using genetics to understand mating systems, movement, impacts of environmental change). Thus, familiarity with organismal ecology will help you appreciate your learning. There are some basic statistics in this class. You must correctly interpret basic stats such as means, deviations from expected means, and simple significance tests (review your Stats material!).

Poll Everywhere will be used in class to conduct learning assessments (participation grades). You do not need to have an app or software. However, you will need to either be working with a Wi-Fi connection or be able to send responses via text. If you do not have access via smartphone, laptop, or tablet, let us know, and you will be allowed to participate using pen and paper.

Assessments:

Participation: Participation marks will be accumulated throughout the term and scaled to count for 10% of your final grade. Participation points will come predominantly from:

- Responding to in-class questions using the *iClicker REEF* app
- timely completion of practice quizzes in each Module

To participate fully, you should have a iOS or Android smartphone with you in class. Two missed participation marks will be excused in the final tally.

Lab assignments: Assignments will be of mixed format:

Problem sets will be assigned to renew your understanding of Mendelian genetics and the Hardy-Weinberg Principle.

Simulation software will be used to demonstrate and reinforce basic principles of population genetics.

R exercises will utilize RStudio Cloud. R is a highly flexible 'programming language' that is a mainstay in biological sciences. Based on the tutorials during the Monday meetings, you will be provided the code and datasets to analyze and interpret in these cases.

Answers to assignments will typically be due by the Monday following the lab (see Canvas Modules and Assignments).

Capstone assignment

You will be responsible for completing one of the two following options:

1) *Wakelet Assignment:* Students will create a Wakelet (http://wakelet.com/) on a chosen topic in conservation genetics.

   Wakelets are online information portals that summarize the content of a given issue. They include embedded links to various online content, including articles, blogs, images, Twitter, and YouTube. This assignment will also require a presentation during the last two Mondays of the course.

   Topics will be first come, first serve. Replicate topics (i.e., two students doing the same species) will not be allowed. Also, issues emphasized in class will not be permitted.

2) Risk assessment evaluating a genetic management option for a species of conservation concern. This assessment will be a written report that will identify a contemporary genetic management topic of interest to the student that was <u>not</u> discussed in class. This assignment can be completed individually or in teams of two students.

   Topics will be first come first serve. Replicate topics (i.e., two students doing the same species) will not be allowed. Also, topics emphasized in class will not be allowed.

Midterm exams: There will be two in-class midterms, consisting of multiple format questions (MC, fill in the blank, short answer, problems, etc.). These exams are 50 minutes in length.

Final: The final will be a cumulative exam taken during the registrar-assigned date and time. This exam will be optional and will replace the lowest quiz grade obtained previously.

Assessments	Points	% of grade
Module assessments		**45%**
Module quiz 1 (Feb 5, in class)		15%
Module quiz 2 (Mar 4, in class)		15%
Module quiz 3 (Apr 8, in class)		15%
Module quiz make up (optional, Apr 24)		(15%)
Participation		**10%**
Lab assignments (7 total)		**30%**
Capstone assignment		**15%**
Final exam (May 3, 7:30 AM)	100	
Total	400	100%

Grading Scale: A >= 90%, A- = 85-89.99%, B+ = 80-84.99%, B = 77-79.99%, B- = 74-76.99%; C+ =70-73.99%, C = 66-69.99%, C- = 63-65.99%, D =60-62.99%, E<=60%

Below is a weekly list of general topics that will be covered in class.

Module	Week(s)*	Module	Main learning topics:
	1	"Start here"	• Recall key aspects of the course presented in the syllabus
I	1	What should we conserve?	• Define and describe conservation genetics
II	2	Understanding genetic polymorphisms	• Phenotypic variation in natural populations • Genetic variation in wild populations
III	3-4	Random mating populations	• Review of Mendelian laws • Random mating model (RMM) • Estimating genetic variation with genetic markers • Estimating departures from RMM
IV	5-6	Genetic drift and Inbreeding	• Understanding the consequences of small population sizes on the RMM • Modeling drift

			• Effective population size
	7	MT 1	Weeks 1 - 6
V	7-8	Natural selection	• Selection and fitness • Selection in small populations • Modeling selection
VI	8-9	Population subdivision	• Defining and understanding structured populations • F-statistics • Detecting population structure with genetic markers
	10	Spring Break	
VII	11-12	Hybridization	• fitness consequences of hybridization • Differentiate between natural and anthropogenic hybridization
VIII	12	Invasive species	• Genetic analysis of invasives • Hybridization and invasiveness
	13	MT 2	• Weeks 7-13
IX	13-16	Applied topics in wildlife genetics	• Population viability • Conservation Units • genetics of exploited populations • Genetics and the law

*Dates are subject to change.

Attendance and Make-Up Work

I consider class attendance to be mandatory. Success in this class will require you to be engaged. Although attendance will be taken in class, it is not graded directly. However, much of your participation grade will be assessed during class meetings (see assignment types above). Acceptable reasons (see below) for missing classes or exams will be considered case-by-case but will follow the guidelines set by the University.

UF acceptable reasons for absence from or failure to engage in class include illness; Title IX-related situations; serious accidents or emergencies affecting the student, their roommates, or their family; special curricular requirements (e.g., judging trips, field trips, professional conferences); military obligation; severe weather conditions that prevent class participation; religious holidays; participation in official university activities (e.g., music performances, athletic competition, debate); and court-imposed legal obligations (e.g., jury duty or subpoena).

For all planned instances where an excused absence is expected, students must inform the instructor as early as possible before the class. For all unplanned absences because of accidents or emergencies, students should contact their instructor as soon as conditions permit.

Students shall be permitted a reasonable amount of time to make up the material or activities covered during absence from class or inability to engage in class activities for the above reasons.

If students do not participate in at least one of the first two class meetings of a course or laboratory in which they are registered and have not contacted the WEC department to indicate their intent, they can be dropped from the course. However, if you intend to be dropped, you must not assume that you will

be dropped automatically. The department will notify students if they have been dropped from the course.

The University recognizes the right of the instructor to make attendance mandatory and requires documentation for absences (except for religious holidays), missed work, or inability to engage in class. After due warning, an instructor can prohibit further attendance and subsequently assign a failing grade for excessive absences.

Lectures and lab sessions will be held in person and are expected to be attended by all. I do not provide make-up assignments for late or missing work. As in all courses, unauthorized recording and sharing of recorded materials are prohibited.

Online Course Evaluation Process:

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 professionally and respectfully 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/.

Academic Honesty:

As a student at the University of Florida, you have committed to upholding the Honor Code, which includes the pledge: "*We, the University of Florida community members, 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. The following pledge is required or implied on all work submitted for credit at the University of Florida: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment*."

Your responsibility is to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. You are assumed to complete all work independently in each course unless the instructor provides explicit permission 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 the appropriate personnel. 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 university students must obey software use laws and legal agreements. Failure to do so can lead to monetary damages and 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, https://disability.ufl.edu/

Campus Helping Resources:

Students experiencing crises or personal problems that interfere with their well-being are encouraged to utilize the University's counseling resources. The Counseling & Wellness Center provides confidential counseling services for currently enrolled students at no cost. Resources are available on campus for students having personal problems or lacking straightforward career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575,* **www.counseling.ufl.edu**

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

- U Matter We Care, **www.umatter.ufl.edu/**
- *Career Connections Center,* First Floor JWRU, 392-1601, https://career.ufl.edu/.
- Student Success Initiative, http://studentsuccess.ufl.edu.
- Student Complaints:

• Residential Course: https://sccr.dso.ufl.edu/policies/student-honor-code-student- conduct-code/.

• Online Course: http://www.distance.ufl.edu/student-complaint-process