WIS 3553 C - Introduction to Conservation Genetics

Spring 2026

Lecture: M/F 3:00-3:50 PM [PSY 0130]

Lecture/lab: W 12:50-2:45 PM; 3:00-4:55 PM [MCCB 3086]

Instructor: Dr. Savannah Grace

T.A.: Dr. Adele Pietras

Office Location: NZ 362

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Office Hours: Dr. Grace – M/F 1:30-2:30 PM or by appointment, Dr. Pietras – W 10:00 AM - 12:00 PM

Course Description

Protecting biodiversity in a time of accelerating global extinction is one of the most difficult challenges facing conservation biology. Many species exist in fragmented habitats, where small and isolated populations face increased risks of inbreeding, loss of genetic diversity, and extinction. Conservation genetics and genomics provide powerful tools for understanding and mitigating these risks, but their application requires a strong understanding of population genetics theory as well as familiarity with modern analytical approaches. This course introduces the principles and applications of conservation genetics, with an emphasis on using genetic frameworks to identify and prioritize wildlife populations in need of genetic management.

This course provides students with an overview of basic population genetics and a practical understanding of how genetics is used to manage wildlife populations. This course is designed for Wildlife Ecology and Conservation majors.

While this course is open to non-majors, it is not sufficient as a genetics course for aspiring veterinarians. This course is a prerequisite for Conservation Biology (WIS 4501 and WIS 4554).

The lectures and assignments for this course will be conducted primarily in person; PDFs of the lecture slides will be available before each class and readings will be assigned beforehand.

Course Objectives

The overarching goal of this course is to provide students with the understanding and practical skills necessary to identify, evaluate, and prioritize wildlife populations that require genetic management. By the end of this course, students will be able to:

• Explain and apply basic principles of conservation genetic theory to understand the genetic consequences of small populations and evaluate strategies for genetic management.

• Describe the importance of genetic variation and its role in population persistence, adaptation, and long-term evolutionary potential.

• Analyze and interpret genetic data using appropriate analytical tools, including Rstudio, and critically evaluate outputs generated with AI-assisted analytical methods.

• Communicate genetic findings and management recommendations clearly and effectively to scientific, management, and public audiences.

Course Prerequisites

Prerequisites for this course include **Introduction to Statistics (STA 2023)** and at least **one introductory ecology course** (WIS3404, PCB 3601C, PCB 4043C, or FOR 3153C). These prerequisites are required because the course builds on a foundational understanding of statistical reasoning and organismal ecology. Throughout the semester, students will apply basic statistical concepts and interpret their results in biological and conservation contexts.

It is important that students begin the course with a solid understanding of basic statistics and organismal ecology on which to build new knowledge. Additional statistical methods relevant to conservation genetics will be introduced during the course, and students will be expected to correctly interpret and apply these methods.

Requests for prerequisites waivers are generally denied.

Required Text and Supplies

No specific textbook is required for this course. All assigned readings and instructional materials will be provided on Canvas. Students who wish to use a supplemental text may find the following books helpful:

• *Allendorf, F. W., Funk, W. C., Aitken, S. N., Byrne, M., & Luikart, G. (2022).* **Conservation and the Genomics of Populations** (3rd ed.).

• *Frankham, R., Ballou, J. D., & Briscoe, D. A. (2010)*. **Introduction to Conservation Genetics** (2nd ed.).

• *Laruson, A. J., & Reed, F. A. (2018).* **Population Genetics with R: An Introduction for Life Scientists**.

Assignments

Participation (10%):

Participation points will be accumulated throughout the term and will account for 10% of the final grade. Participation will be assessed through brief in-class quizzes given during the first fifteen minutes of each class period. These quizzes are designed to encourage participation and engagement and will be graded for completion rather than accuracy.

Lab Assignments (30%):

There will be nine lab assignments, which together will account for 30% of the final grade. Lab assignments will be of mixed format and may include problem sets, literature review and discussion activities, AI software implementation and evaluation, and simulation-based exercises using Rstudio Cloud.

Lab assignments will typically be due by the next Wednesday following the lab session. All due dates and submission instructions will be posted on Canvas.

Module Exams (45%):

There will be three in-class module exams, each worth 15% of the final grade. Exams will be given during the designated lab period and will include a mix of question formats, such as multiple choice, fill-in-the-blank, short answer, and problem-solving questions.

Final Exam (optional):

An optional cumulative final exam will be offered during the final week of classes. Students may choose to take this exam to replace their lowest module exam score. If a student chooses not to take the final exam, their existing module exam scores will be used to calculate their final grade.

Final Project and Presentation (15%):

Each student will complete a final project and deliver a ten-minute presentation during the final weeks of the course. The final project will account for 15% of the final grade. Final project format options will be provided midway through the semester. Projects may be completed individually or in groups of up to four (4) students.

Assignments	% of grade
Module Exams	**45%**
Module Exam 1 (2/11)	15%
Module Exam 2 (3/11)	15%
Module Exam 3 (4/8)	15%
Module 4 Exam (4/22)	-
Participation	**10%**
Lab Assignments	**30%**
Final Project	**15%**
Total	**100%**

Grading scale: A >= 93-100, A- = 90-92.9, B+ = 87-89.9, B = 83-86.9, B- = 80-82.9, C+ = 77-79.9, C = 73-76.9, C- = 70-72.9, D+ = 67-69.9, D = 60-66.9, E <60

Course Outline

Week	Content
Module 1	
Week 1 (Jan 12-16)	• **Introduction to conservation genetics** • Review syllabus • What should we conserve? • *Assignment*: Lab 1
Week 2 (Jan 21-23)	• **Understanding genetic polymorphisms** • Phenotypic variation in natural populations • Genetic variation in natural populations • *Assignment*: Lab 2
Week 3-4 (Jan 26- Feb 6)	• **Random mating populations** • Review Mendelian laws • Random mating model (RMM) • Estimating genetic variation • Estimating deviations from RMM • *Assignments*: Lab 3 & 4
Module 2	
Week 5-6 (Feb 9-20)	• **Genetic drift and inbreeding** • Genetic consequences of small population sizes • Modeling drift • Effective population size • *Assignments:* Module Exam 1 (2/11), Lab 5 (2/18)
Week 7 (Feb 23-27)	• **Natural Selection** • Selection and fitness • Selection in small populations • *Assignment*: Lab 6
Week 8-9 (Mar 2-13)	• **Population subdivisions** • F-statistics • Genetic divergence among populations • Estimation of gene flow • *Assignments*: Lab 7 (3/4), Module Exam 2 (3/11)
Week 10 (Mar 16-20)	Spring break
Module 3	
Week 11 (Mar 23-27)	• **Hybridization** • Detecting and describing hybridization • Fitness consequences of hybridization • Natural and anthropogenic hybridization • *Assignment*: Lab 8

Week 12 (Mar 30- Apr 3)	• **Invasive species** • Genetic analysis of introduced species • Hybridization and invasiveness • Management and control • *Assignment:* Lab 9
Module 4	
Week 13 (Apr 6-10)	• **Conservation and management** • Inbreeding depression • Conservation breeding and restoration • Genetic identification and monitoring • *Assignment*: Module Exam 3
Week 14 (Apr 13-17)	• **Conservation genetics in practice** • Science and policy • Using genetic data for conservation strategy • *Assignment*: Final assignment presentations
Week 15 (Apr 20-22)	• Open lectures (make-up, professional presentations, etc.) • *Assignment*: Cumulative final exam (optional)

* Dates are subject to change

Course Policies

Attendance and Make-up Work:

Regular attendance is expected and considered necessary for success in this course. Students are expected to be engaged and actively participate in class discussions and in-class activities. Attendance and participation in the in-class quizzes will be used to calculate the participation component of the final grade. Each student will be permitted **up to three (3) unexcused absences** without penalty. Any additional unexcused absences will negatively impact the final participation grade.

Excused absences and missed assessments will be considered on a case-by-case basis and must comply with university attendance policies, which can be found at: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/.

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."

It is expected that you 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.

Online Couse 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/publicresults/.

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 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, http://www.counseling.ufl.edu, Counseling Services, Groups and Workshops, Outreach and Consultation, Self-Help Library, Wellness Coaching.
- U Matter, We care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392- 1575 so that a team member can reach out to the student.
- 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.u fl.edu/student-complaint-process.

Academic Resources

- E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.
- Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring .http://teachingcenter.ufl.edu/