BSC 512 01W Advanced Ecological Genetics

COURSE SYLLABUS: Fall 2026

INSTRUCTOR INFORMATION

Instructor: Bjorn Schmidt
Office Location: STC 212
Office Hours: MWF 11am - 12pm or by appointment
Office Phone: 903-886-5938
University Email Address: bjorn.schmidt@etamu.edu
Preferred Form of Communication**: email**
Communication Response Time: **24 hours (except holidays and weekends)**

COURSE INFORMATION

MATERIALS – TEXTBOOKS, READINGS, SUPPLEMENTAL READINGS

Textbook(s) Required – none; all materials from powerpoints/online videos

Software Required – machine capable of accessing d2l (learning management system)

Optional Texts and/or Materials: the course draws some information from the following texts (mostly from specific chapters from each text listed instead of using the whole book), these can be used for additional reading/understanding if interested, but are not required:

Introduction, theory, and foundations

1) Evolution, 5th ed. 2022. Futuyma, Douglas J. & Kirkpatrick, M.
2) A Primer of Ecological Genetics. 2004. Conner, Jeffrey K. & Hartl, Daniel L
3) Population Genetics and Microevolutionary Theory, 2nd ed. 2021. Templeton, Alan.

Applied ecological genetics

4) Conservation and the Genomics of Populations, 3rd edition. 2022. Allendorf, Fred W., Funk, W. Chris, Aitken, Sally N., Byrne, Margaret, & Luitkart, Gordan.
5) Landscape Genetics: Concepts, Methods, Applications. 2016. Balkenhol, Niko, Cushman, Samuel A., Storfer, Andrew T., & Waits, Lisette P. (eds).

COURSE DESCRIPTION

Ecological genetics is a study of the genetic processes that occur within and among populations and which contribute to population differentiation and microevolution. Topics covered include measures of genetic variation, genetic drift, natural selection and adaptation, phenotypic evolution, the evolution of life histories, sex and reproductive success.

Prerequisite: An undergraduate degree in in Biology, Wildlife, or related discipline or permission from instructor

STUDENT LEARNING OUTCOMES

1. Understand the sources and influences on genetic variation patterns in natural populations and the implications of genetic change in these systems
2. Describe microevolutionary change through a mathematical population genetics framework
3. Compare and contrast the four microevolutionary forces that cause genetic change in populations, including their effects and their interactions
4. Understand patterns of sexual selection in a genetics framework
5. Describe models of microevolutionary change in the genome and models of change on phenotypic traits (quantitative genetics)
6. Understand how landscapes influence regional genetic patterns through gene flow and isolation, and be able to understand introductory concepts of landscape genetics

COURSE REQUIREMENTS

MINIMAL TECHNICAL SKILLS NEEDED

-ability to use software that can access and read pdfs and access d2l
-ability to use writing software (MS Word or able to export as a MS Word file (.doc or .docx)
-algebraic and arithmetic literacy, ability to work with linear mathematical equations and solve for unknown values or understand mathematical relationships based on variable patterns in equations

INSTRUCTIONAL METHODS

All course materials will be presented through d2l. The class format will be asynchronous, following the schedule that appears later in the syllabus. Lecture videos and corresponding powerpoint slides will be uploaded to d2l weekly. There will also be periodic student-led discussion boards over research papers in the field.

This course will use Respondus lockdown browser and Respondus monitor for online exams. Students are required to use these software programs to maintain academic integrity in compliance with online course policies within the College of Science and Engineering. Instructions for software download and use will be given in d2l prior to the first exam in the course.

Respondus LockDown Browser and Respondus Monitor

Respondus LockDown Browswer and Respondus Monitor are tools used to help maintain academic integrity during online exams.

What is LockDown Browswer?

Respondus LockDown Browser is a secure, custom web browser that restricts what students can do while taking an online exam. When using LockDown Browser, students cannot:

- Open other applications or websites
- Copy, print, or take screenshots
- Use keyboard shortcuts or right-click menus
- Exit the exam until it is submitted

The exam runs full-screen, and standard system controls and features are disabled to create a controlled testing environment.

What is Respondus Monitor?

Respondus Monitor is an optional add-on that works with LockDown Browser to provide automated online proctoring. If enabled, it:

- Uses a student's webcam (and sometimes screen recording) during the exam
- Records the testing session for later review
- Allows instructors to review flagged or suspicious activities

Respondus Monitor serves as both a deterrent and a review tool for maintaining exam integrity.

What Students Should Expect

- Students must install LockDown Browser before taking a required exam
- Exams open only within LockDown Browser, not standard browsers
- If Respondus Monitor is required, students will complete a brief setup (e.g., webcam check) before starting the exam
- Instructors may review recordings after the exam is complete

STUDENT RESPONSIBILITIES OR TIPS FOR SUCCESS IN THE COURSE

You are expected to keep up with all of the online course materials provided each week. Attendance will be assessed each week through logging onto d2l and interacting with powerpoints, videos, quizzes, exams, and discussion board. The best tips for success are to schedule your time in order to not fall behind in the assignments and course work. Additionally, videos are provided to give more context for course materials, which are recommended to be viewed to provide additional context for the course materials.

GRADING

Final grades in this course will be based on the following scale:

A: 89.96-100%
B: 79.96-89.95%
C: 69.96-79.95%
D: 59.96-69.95%
F: <59.96%

The *syllabus/schedule are subject to change.*

Total points corresponding to the final letter grades

A = 396 - 440 Points
B = 352 - 395 Points
C = 308 - 351 Points
D = 264 - 307 Points
F = <264 Points

Weights of the assessments in the course:

Tests (2) = 200 points - ~45%
Quizzes (7) = 140 points - ~32%
Discussions (5) = 100 points - ~23%
TOTAL = 440 points - 100%

ASSESSMENTS

Tests: There will be two exams, a midterm and a final; final is non-cumulative only covering the second half of the course. 100 points each
Quizzes: There will be 7 quizzes, with multiple choice and short answer questions. 20 points each.
Discussions: There will be five scientific paper discussions throughout the semester. For each of these, the class will be given a list of several papers and each student will select one paper to read and present in a discussion post (specific instructions posted in d2l). For full points, students will need to have one main post (paper summary and analysis) and one reply to another student's main post, with replies being meaningful interaction and discussion (not just posting "agree" or "good point"). 20 points each.

General Makeup Policy: The student is responsible for requesting a makeup when they are unable to submit the regularly scheduled assessment and must schedule the makeup within **1 day** after the due date. If the assessment is not made-up or turned in, the student will receive a zero for that item. Exams or quizzes cannot be made up after feedback has been given to the class to preserve integrity of these assessments.

Course Outline/Calendar

week 1: 08/20-08/21

1) Introduction
   Powerpoint 1 (topic 1)

week 2: 08/24-08/28

2) Basic Genetics Review
Powerpoint 2 (topic 2)

Friday:
Quiz 1 posted - covers topics 1-2 - due Wed, 09/02

week 3: 08/31-09/04

3) Phenotypic Variation
4) Genetic Variation
Powerpoint 3 (topics 3-4)

Thursday:
First Paper Discussion posted – due by Friday 9/11

week 4: 09/07-09/11

*Monday 09/07 is a holiday (Labor Day)

5) Genetic Markers and Techniques
6) Population genetics introduction; Hardy-Weinberg Equilibrium
Powerpoint 4 (topics 5-6)

Friday:
Quiz 2 posted - covers topics 3-6 - due Wed, 09/16

week 5: 09/14-09/18

7) Deviations to HWE; microevolution overview
8) Non-Random Mating & Inbreeding
Powerpoint 5 (topics 7-8)

week 6: 09/21-09/25

9) Genetic Drift
10) Gene Flow
Powerpoint 6 (topics 9-10)

Friday:
Quiz 3 posted - covers topics 7-10 - due Wed, 09/30

week 7: 09/28-10/02

11) Mutation
12) Natural Selection; positive & negative selection
Powerpoint 7 (topics 11-12)

Monday:
Second Paper Discussion posted – due by Tuesday 10/06

Friday:
Quiz 4 posted - covers topics 11-12 - due Wed, 10/07

week 8: 10/05-10/09

*Thursday and Friday are school holidays (Fall Break)

13) Balancing selection & historical contingency models
Powerpoint 8 (topic 13)

week 9: 10/12-10/16

Monday:
Midterm Exam posted - covers topics 1-13 - due by Fri, 10/16

week 10: 10/19-10/23

14) Selection and Life History Traits
15) Sexual Selection
Powerpoint 9 (topics 14-15)

Thursday:
Third Paper Discussion posted – due by Friday 10/30

week 11: 10/26-10/30

16) Selection on polygenic traits; Phenotypic selection models
17) Quantitative genetics
Powerpoint 10 (topics 16-17)

Friday:
Quiz 5 posted - covers topics 14-17 - due Wed, 11/4

week 12: 11/2-11/6

18) Artificial Selection – Applied Quantitative Genetics
Powerpoint 11 (topic 18)

Thursday:
Fourth Paper Discussion posted – due by Friday 11/13

week 13: 11/9-11/13

19) Populations and metapopulations
20) Landscape genetics; Quantifying genetic differentiation
21) Isolation by distance
Powerpoint 12 (topics 19-21)

Friday:
Quiz 6 posted - covers topics 18-21 - due Wed, 11/18

week 14: 11/16-11/20

22) Isolation by Resistance
23) Isolation by Environment
24) Genetic Clustering Analysis
Powerpoint 13 (topics 22-24)

week 15: 11/23-11/27

*Wednesday - Friday are school holidays (Thanksgiving Break)

25) Landscape Genetics in Terrestrial Animals
26) Landscape Genetics in Terrestrial Plant Populations
27) Landscape Genetics in Aquatic Animals
Powerpoint 14 (topics 25-27)

*note this material covers weeks 15 and 16, posted on week 15 for independent, flexible pacing (you don't have to finish these by break)

week 16: 11/30-12/4

Monday:
Fifth Paper Discussion posted – due by Thursday 12/03

Monday:
***Quiz 7 posted - covers topics 22-27 - due Friday, 12/04**

The *syllabus/schedule are subject to change.*

finals week: 12/7-12/11

Monday:
Final Exam posted - covers topics 14-27 - due by Fri, 12/11

TECHNOLOGY REQUIREMENTS

LEARNING MANAGEMENT SYSTEM (LMS)

All course sections offered by East Texas A&M University have a corresponding course shell in the myLeo Online (D2L Brightspace) LMS. Below are the technical requirements:

- LMS Requirements
- LMS Browser Support
- Zoom Video Conferencing Tool

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@etamu.edu.

COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

TECHNICAL SUPPORT

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778 or view other support options.

STUDENT RESPONSIBILITIES FOR THE COURSE

CWID AND PASSWORD

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@etamu.edu.

TECHNOLOGY-RELATED ISSUES

Personal computer and internet connection problems do not excuse the requirement to complete all coursework in a timely and satisfactory manner. Each student needs a backup method to handle these inevitable problems. These methods might include having a backup PC at home or work, temporarily using a computer at a friend's home, at the local library, at office service companies, at Starbucks, or at an ETAMU campus open computer lab.

TECHNOLOGY REQUIREMENTS AND SUPPORT

MINIMAL TECHNICAL SKILLS NEEDED

Students will need a reliable computer and internet access for this course. Students must be able to use myLeo email, myLeo Online (D2L Brightspace), and Microsoft Office effectively.

LEARNING MANAGEMENT SYSTEM (LMS) – D2L Brightspace

All course sections offered by East Texas A&M University have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are the technical requirements:

- View the Learning Management System Requirements Webpage.
- Learn more on the LMS Browser Support Webpage.

TECHNICAL SUPPORT

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found on the Brightspace Support Webpage.

COMMUNICATION AND SUPPORT

INTERACTION WITH INSTRUCTOR STATEMENT

If you have any questions or are having difficulties with the course material, please contact your instructor. Correspondence will always be through university email (your "myLeo" mail), and announcements will be posted in myLeo online (D2L Brightspace). You will not RECEIVE email through Brightspace, so be sure to check your ETAMU email for communication. Students are encouraged to check their university email daily.

INCLUDE THE FOLLOWING IN EMAILS WITH INSTRUCTOR:

- Course name and subject in the subject line
- Salutation (Good afternoon, Dr. Jackson)
- Proper email etiquette (no "text" emails – use proper grammar and punctuation)
- Student name and CWID after the body of the email (possibly add to student signature on email)

The *syllabus/schedule are subject to change.*

COURSE AND UNIVERSITY PROCEDURES/POLICIES

SYLLABUS CHANGE POLICY

The syllabus is a guide. Circumstances and events, such as student progress, may necessitate the instructor's modification of the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

STUDENT CONDUCT

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail online in the Student Guidebook.

Students should also consult the Rules of Netiquette Webpage for more information regarding how to interact with students in an online forum.

ETAMU ATTENDANCE

For more information about the attendance policy, please view the Attendance Webpage and the Class Attendance Policy.

ACADEMIC INTEGRITY

Students at East Texas A&M University are expected to maintain high standards of integrity and honesty in all their scholastic work. For more details and the definition of academic dishonesty, see the following procedures:

Undergraduate Academic Dishonesty University Procedure 13.99.99.R0.03

Undergraduate Student Academic Dishonesty Form

Graduate Student Academic Dishonesty University Procedure 13.99.99.R0.10

Graduate Student Academic Dishonesty Form

USE OF ARTIFICIAL INTELLIGENCE

East Texas A&M University acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that have the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors' guidelines. If no instructions are provided, the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources

STUDENTS WITH DISABILITIES-- ADA STATEMENT

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides reasonable accommodations for their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
East Texas A&M University
Velma K. Waters Library Rm 162
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Email: studentdisabilityservices@etamu.edu
Website: Office of Student Disability Services

NONDISCRIMINATION NOTICE

East Texas A&M University will comply in the classroom and in online courses with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information, or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

CAMPUS CONCEALED CARRY STATEMENT

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in East Texas A&M University buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and ETAMU Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all East Texas A&M University campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

EAST TEXAS A&M SUPPORTS STUDENTS' MENTAL HEALTH – COUNSELING SERVICES

The Counseling Center at East Texas A&M University, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connections to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit the Counseling Center website.

MENTAL HEALTH AND WELL-BEING

The university aims to provide students with essential knowledge and tools to understand and support mental health. As part of our commitment to your well-being, we offer access to Telus Health, a service available 24/7/365 via chat, phone, or webinar. Scan the QR code or download the app and explore the resources available to you for guidance and support whenever you need it.

ACCREDITING INFORMATION AND MISSION STATEMENT:

East Texas A&M is accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) to award baccalaureate, master's and doctoral degrees. Academic programs in the Department of Biological and Environmental Science operate under this institutional accreditation.

College of Science and Engineering Mission Statement:

We transform lives by providing an accessible education in an environment where faculty and staff care and are dedicated to the success of all our students throughout their academic career. We empower our students, faculty and staff to become the best version of themselves by supporting their continuous development and growth. Fueled by our resilience, tenacity, and talents, we strengthen the rural and urban communities we serve. Innovation is the heartbeat of East Texas A&M University, with career preparedness as a cornerstone of our educational mission. We are committed to ensuring our graduates are well-prepared for the challenges and opportunities that lie ahead. Through robust career exploration, internships, industry partnerships, and skill development initiatives, we bridge the gap between academia and the workplace.