BSC 512: Ecological Genetics – Summer I 2023

Web Based Course

Instructor Information:
Bjorn Schmidt
Office: STC 212
Email: bjorn.schmidt@tamuc.edu
Preferred contact: email
Virtual office hours: 9-5 M-F, scheduled by appointment through email

Reference Textbooks (not required, powerpoints will use some material from these sources)

1) Evolution, 5th ed. 2022. Futuyma, Douglas J. & Kirkpatrick, M.

2) Conservation and the Genomics of Populations, 3rd edition. 2022. Allendorf, Fred W., Funk, W. Chris, Aitken, Sally N., Byrne, Margaret, & Luitkart, Gordan.

3) Landscape Genetics: Concepts, Methods, Applications. 2016. Balkenhol, Niko, Cushman, Samuel A., Storfer, Andrew T., & Waits, Lisette P. (eds).

4) A Primer of Ecological Genetics. 2004. Conner, Jeffrey K. & Hartl, Daniel L

5) Population Genetics and Microevolutionary Theory, 2nd ed. 2021. Templeton, Alan.

Course Description
Ecological genetics is a hybrid field used to describe ecological influences on genetic variation within and between populations. Ecological genetics is comprised of aspects from the fields of spatial ecology, population genetics, and evolution. Ecological genetics primarily investigates drivers and interactions of short-term genetic change in variation in populations (microevolution). The course will encompass background reviews of mendelian and population genetics, patterns of phenotypic and genetic variation, genetic mutation, genetic drift, gene flow, genetic differentiation and population structure, natural selection, quantitative genetics, artificial selection, and patterns and techniques of landscape genetics. Ecological genetics is primarily a research field, so a component of the class will be spent examining how concepts detailed in the course are applied in peer-reviewed literature provided by the instructor.

Student Learning Outcomes

- Students will understand the sources, implications of, and influences on genetic variation in natural populations
- Students will be able to conceptualize microevolutionary processes through a population genetics framework
- Students will understand the four microevolutionary forces that cause genetic change in populations, their effects, and their interactions
- Studies will understand patterns and differences in selection patterns on genotypes and quantitative phenotypic traits
- Students will understand research applications of ecological genetics and know common genetic measurements of populations and measurements of gene flow between populations
- Students will understand how ecological factors promote or restrict gene flow between populations in plants, terrestrial animals, and aquatic organisms

Course Materials and Online Presentation

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. Virtual office hours for the course are available by appointment for opportunities to ask questions about the course or topics covered in the course. Questions will also be responded to promptly through email (within 24 hours). There will also be periodic quizzes, paper reports, and exam for assessment.

Course Evaluations

Tests: There will be two exams, each covering ~1/2 of the course content.
Quizzes: There will be four weekly quizzes, consisting of multiple choice questions – in general quizzes will be posted on either Friday or Wednesday.
Discussion: There will be weekly paper discussions in d2l, for full points, students will need to have one main post and one reply to another student's main post for each weekly topic; Discussion papers will be posted on Wednesdays.
Paper Report: There will be a paper report due at the end of the semester. Details for this report will be posted in d2l.

Evaluation Points

Two exams - 200 points
4 quizzes – 80 points (20 points each)
Paper Discussions – 100 points (25 points each)
Paper Report – 50 points

Total points = 430

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

Online Attendance: 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, and discussion board. Because this is a summer course, the course schedule is full each week, so please try not to fall behind as it will be difficult to catch up in later weeks of the semester.

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 **3 days** after the due date. If the assessment is not made-up, the student will receive a zero for that item. **Note**: makeups for the final exam and items due on 07/08 will not be available as final grades will need to be calculated on 07/09, if you have extenuating circumstances for the final or other materials at the end of the summer semester, please contact me by email.

General Course Outline

-Lecture videos and slides for the corresponding week's topics will be published on d2l under the content tab, generally on Mondays, Wednesdays, and Fridays.

-Quizzes will be posted on Fridays or Wednesdays under the activities:quizzes tab in d2l and will be due by indicated in schedule at 11:59 pm

> (note, as schedule is tight, and to allow students access to quizzes for review before taking exams, quiz 2 and quiz 4 will need to be completed on time as in the schedule and are not available for due date extensions)

-Peer-reviewed research papers for weekly discussion will be available under the content tab (generally posted on Wednesdays), and generally students will have one week to read the paper and discuss concepts in the discussion board in d2l

-Exams will be available under the activities:quizzes tab in d2l and will be due by indicated date at 11:59 pm

> (note, as schedule is tight there is no extension available for exam 2 as grades are due for the semester soon after the last class day)

-The paper report is due on the last day of class (Thursday, July 6th at 11:59 pm)

(note, as schedule is tight there is no extension available for the paper report as grades are due for the semester soon after the last class day)

-Virtual office hours can be scheduled by appointment for 9am - 5pm M-F by email request; other specific questions or concerns can be answered by email

Tentative Course Schedule (subject to change)**:**

week 1 – 06/05

Monday: **Powerpoint 1 (topics 1-3)**

1) Syllabus/Welcome

2) What is Ecological Genetics?

3) Basic Genetics Review

Wednesday: **Powerpoint 2 (topics 4-5)**

4) Phenotypic Variation

5) Genetic Variation

First Paper Discussion posted – comments due by Tuesday 6/13

Friday: **Powerpoint 3 (topics 6-7)**

6) Genetic Markers and Techniques

7) Population genetics introduction; Hardy-Weinberg Equilibrium

Quiz 1 - covers topics 1-7, due Tuesday, 06/12 at 11:59 pm

week 2 – 06/12

Monday: **Powerpoint 4 (topics 8-9)**

8) Deviations to HWE; microevolution overview

9) Non-Random Mating & Inbreeding

Wednesday: **Powerpoint 5 (topics 10-12)**

10) Genetic Drift

11) Gene Flow, Populations & Metapopulations

12) Dispersal patterns

Second Paper Discussion posted – comments due by Tuesday 6/20

Quiz 2 - covers topics 8-12; due Sunday, 06/18 at 11:59 pm

Friday: **Powerpoint 6 (topics 13-15)**

13) Mutation as microevolutionary force

14) Natural Selection; positive & negative selection

15) Balancing selection & historical contingency models

week 3 – 06/19

Monday – Juneteenth, university closed

Monday:

Quiz 1 and 2 open for review for exam studying

Tuesday:

Exam One (covers topics 1-15); due Friday, June 23 at 11:59 pm

Wednesday: **Powerpoint 7 (topics 16-17)**

16) Selection on polygenic traits; Phenotypic models

17) Quantitative genetics & artificial selection

Third Paper Discussion posted – comments due by Tuesday 6/27

Friday: **Powerpoint 8 (topics 18-20)**

18) Landscape genetics; genetic differentiation & population subdivision

19) F-statistics

20) Isolation by distance

Quiz 3 - covers topics 16-19; due Tuesday 06/27 at 11:59 pm

week 4 – 06/26

Monday: **Powerpoint 9 (topics 21-22)**

21) Isolation by Resistance

22) Isolation by Environment

Wednesday: **Powerpoint 10 (topics 23-24)**

23) Direct & Indirect Measures of Gene Flow

24) Genetic Clustering Methods

Fourth Paper Discussion posted – comments due by Monday 7/03

Quiz 4 - covers topics 20-24; due Sunday 07/02 at 11:59 pm

Friday: **Powerpoint 11 (topics 25-27)**

25) Landscape Genetics in Plant Populations

26) Landscape Genetics in Terrestrial Animals

27) Waterscape Genetics

week 5 – 07/03

Tuesday – Independence day, university closed

Thursday, July 6th – Last Class Day for Summer I

Monday:

Quiz 3 and 4 open for review for exam

Exam Two (covers topics 16-27), due Thursday July 6th at 11:59 pm

Thursday:

Paper report due at 11:59 pm

Technology Requirements:

LMS

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

LMS Requirements:

https://community.brightspace.com/s/article/Brightspace-Platform-Requirements

LMS Browser Support:
https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.ht m

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@tamuc.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. Other support options can be found here:

https://community.brightspace.com/support/s/contactsupport

Interaction with Instructor Statement

Response time to any questions sent by email regarding the course will be answered within 72 hours. However, students are encouraged to interact with the instructor directly during the class time and office hours, if necessary. Exceptions such as widespread internet outage apply.

Counseling Services Statement

The Counseling Center at A&M-Commerce, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection 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 www.tamuc.edu/counsel

Course and University Procedures/Policies:

Course Specific Procedures/Policies:
You are expected to check your TAMUC email and d2l every day to check for any announcements. Additional information about all course assessment components is provided under "Course Evaluations". Please do not attend class if feeling ill, if an illness occurs during a course assessment, please see the "General Makeup Policy" section above for guidance.

University Specific Procedures:

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 in the Student Guidebook.

http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuideboo k.aspx

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: Netiquette http://www.albion.com/netiquette/corerules.html

TAMUC Attendance

For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01. http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf

Academic Integrity

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

Undergraduate Academic Dishonesty 13.99.99.R0.03

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

Graduate Student Academic Dishonesty 13.99.99.R0.10

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf

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 for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services

Texas A&M University-Commerce

Gee Library- Room 162

Phone (903) 886-5150 or (903) 886-5835

Fax (903) 468-8148

Email: studentdisabilityservices@tamuc.edu

Website: Office of Student Disability Resources and Services
http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

Nondiscrimination Notice

Texas A&M University-Commerce 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 Texas A&M University-Commerce 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 A&MCommerce 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.

Web url:

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf

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