BSC 512.01W: Ecological Genetics - Fall 2020
Web Based Course

Instructor Information:
Bjorn Schmidt
Office: STC 212
Email: bjorn.schmidt@tamuc.edu
Preferred contact: email
Virtual office hours: by appointment

Recommended textbooks & materials
Access to a computer and d2l (myleo online) is required; all course materials will be uploaded through d2l

There are two recommended textbooks for the course. In order to save costs for students, they are recommended and not required. All test and quiz material will be drawn from the online videos & powerpoints. Readings from the textbooks can be used to supplement the online material, leading to a better understanding of the material for interested students.

The course will use the following two textbooks as a reference:


Course Description
Ecological genetics is a hybrid field used to describe ecological influences on genetic properties within and between populations. Ecological genetics is composed of characteristics from the fields of spatial ecology, population genetics, and evolution. The term has been used to describe research examining both environmental/ecological effects on population genetics within populations (e.g., adaptation, selection) and environmental/ecological effects on gene flow and genetic isolation between populations (e.g., metapopulations, population structure).
Additionally, conservation genetics, which examines the population genetics of rare and endangered species, has many parallels with ecological genetics and will briefly be covered in the course. The first half of the course will contain a review of traditional mendelian genetics, a review of ecological processes of microevolution, and an overview of relevant concepts in population genetics. The second half of the course will examine environmental influences on genetic properties within populations, conservation genetics, and landscape genetics (environmental influences on gene flow between populations).

**Student Learning Outcomes**

- Students will understand the sources, implications of, and influences on genetic variability in natural populations
- Students will be able to conceptualize microevolutionary processes through a population genetics framework
- Students will understand the four microevolutionary forces that influence genetic change in populations, their effects, and their interactions
- Students will know research applications of ecological genetics and know common genetic measurements of populations and measurements of gene flow between populations
- Students will understand how environmental properties interact with the genetic characteristics of populations
- Students will know the role ecological genetics plays in understanding genetic properties of rare and endangered species
- 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, with course lecture videos being posted on Tuesdays each week. The corresponding powerpoint slides used in the videos will also be uploaded to d2l. The schedule for topics covered in the course is presented later in the syllabus. 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. There will be weekly quizzes posted on d2l each Monday (2:30 pm) and exams will be posted through d2l on certain Mondays as well (dates will be marked in the schedule and announcements beforehand will be made in d2l). Exams and quizzes will mostly have a one week deadline for completion (the one during thanksgiving is extended because of the holiday). Other extensions will be handled on a case-by-case basis through email.

**Course Evaluations**

**Tests:** There will be three term exams posted on specific Mondays on d2l and a comprehensive final exam scheduled during finals week.

**Quizzes:** There will be 10 quizzes posted on specific Mondays on d2l (weeks that have an exam will not have quizzes).
**Paper Reports:** During the last two weeks of class, students will need to turn in reports for 3 different peer-reviewed research articles in ecological genetics. Each report will be approximately two pages long. Specific instructions for the reports will be posted in d2l.

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

**Evaluation Points**
3 Exams - 300 points (100 points each)
Final Comprehensive Exam - 200 points
10 weekly quizzes (lowest score dropped) - 200 points (20 points each)
Paper Reports - 150 points (50 points each)

Total points = 850

**Online Attendance:** You are expected to keep up with all of the online course materials provided each week. The goal of the weekly quizzes is to help students maintain a proper learning pace for the material to ensure they are ready for the tests. Attendance will be assessed each week through completion of the weekly quizzes or exams. If your circumstances change this semester and you find that you are unable to keep up with the weekly content schedule for a university excused reason, please contact me through email as soon as possible to discuss alternative solutions.

**General Makeup Policy:** The student is responsible for requesting a makeup when they are unable to attend the regularly scheduled assessment and must schedule the makeup within 5 days after the due date. If the assessment is not made-up, the student will receive a zero for that item.

**Syllabus Change Policy**
The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

**Technology Requirements**
Material will be regularly posted on the D2L online system (available from myLeo app). You will need to have access to this online system using your cwid. Help connecting to this class in the system can be retrieved from the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu. You will need to periodically check this online system and your university email account for class messages.
Course Schedule (Subject to change during the semester)

Schedule notes:
-videos and lecture slides for the corresponding week’s topics will be published on d2l on Tuesdays
-Quizzes and exams will be posted at 2:30 pm on the following Mondays
-All quizzes and exams will be available under the quizzes tab in d2l
-Monday quizzes and exams will be due before the following Sunday at 11:59 pm (roughly one week later); The test available during Thanksgiving has been extended into the following week because of the holiday.
-Topics covered in quizzes and exams are indicated in the schedule
-Virtual office hours for specific questions can be scheduled by appointment or specific questions or concerns can be answered by email

Tentative Schedule:

week 1 - 8/24
Section I. Introduction, background, and population genetics:
Tue:
1) Syllabus>Welcome
2) What is Ecological Genetics?
3) Basic Genetics Review

week 2 - 8/31
Mon. 8/31 - Quiz 1 (Topics 1-3) (available 2:30 pm due by 11:59 pm on 9/6)
Tue:
4) Microevolution Overview
5) Adaptive Microevolution
6) Neutral Microevolution
7) Genetic Variation

week 3 - 9/7
Mon. 9/7 - Quiz 2 (Topics 4-7) (available 2:30 pm due by 11:59 pm on 9/13)
Tue:
8) Genetic Markers & Alleles
9) Random Mating
10) Hardy Weinberg Equilibrium
11) Non-Random Mating, Sexual Selection & Inbreeding

week 4 - 9/14
Mon. 9/14 - Quiz 3 (Topics 8-11) (available 2:30 pm due by 11:59 pm on 9/20)
Tue:
12) Four Forces of Microevolution (allele change in populations over generations)
13) Mutation
14) Gene flow, Populations, & Metapopulations
15) Genetic Drift

week 5 - 9/21
Mon. 9/21 - Quiz 4 (Topics 12-15) (available 2:30 pm due by 11:59 pm on 9/27)
Tue:
16) Genetic Differentiation and Subdivision
17) F-statistics
18) Island Model & Isolation by Distance
19) Effective Population Size
20) Inbreeding Depression
week 6 - 9/28

Mon. 9/28 - Quiz 5 (Topics 16-20) (available 2:30 pm due by 11:59 pm on 10/04)

Tue:

21) Natural Selection & Adaptation
22) Directional, Disruptive, & Stabilizing Selection
23) Overdominance (Heterozygote Advantage)
24) Frequency Dependent Selection
25) Synthesis and Interactions of the Four Microevolutionary Forces

week 7 - 10/05

***Mon. 10/05 - Test 1 (Topics 1-25) (available 2:30 pm due by 11:59 pm on 10/11)

Section 2. Environmental Ecological Genetics (within habitats):

Tue:

26) Phenotypic Plasticity & Genotype-Environment Interactions
27) Correlations Among Traits
28) Linkage Disequilibrium
29) Genetic Correlations in Nature

week 8 - 10/12

Mon. 10/12 - Quiz 6 (Topics 26-29) (available 2:30 pm due by 11:59 pm on 10/18)

Tue:

30) Artificial Selection & Selective Breeding
31) Quantitative Trait Locus (QTL) Mapping
32) Isolation by Environment
week 9 - 10/19
Mon. 10/19 - Quiz 7 (Topics 30-32) (available 2:30 pm due by 11:59 pm on 10/25)
Tue:

**Section 3. Conservation Genetics:**
33) Distinct Evolutionary Lineages & Endangered Species
34) Genetic Bottlenecks & Founder Effects
35) Minimum Effective Population Sizes & Conservation of Genetic Diversity

week 10 - 10/26
***Mon. 10/26 - Test 2 (Topics 26-35) (available 2:30 pm due by 11:59 pm on 11/01)
Section 4. Landscape Ecological Genetics (between habitats):
Tue:
36) Overview of Landscape Ecology
37) Intrinsic & Extrinsic Influences on Gene Flow
38) Landscape Effects on Genetic Variation
39) Isolation by Resistance & Barriers to Gene Flow

week 11 - 11/02
Mon. 11/02 - Quiz 8 (Topics 36-39) (available 2:30 pm due by 11:59 pm on 11/08)
Tue:
40) Direct & Indirect Measures of Gene Flow
41) Coalescent Theory
42) Clustering and Assignment Methods
week 12 - 11/09

Mon. 11/09 - Quiz 9 (Topics 40-42) (available 2:30 pm due by 11:59 pm on 11/15)

Tue:

43) Landscape Genetics in Plant Populations

44) Landscape Genetics in Terrestrial Animals

week 13 - 11/16

Mon. 11/16 - Quiz 9 (Topics 43-44) (available 2:30 pm due by 11:59 pm on 11/22)

Tue:

45) Waterscape Genetics

week 14 - 11/23

***Mon. 11/23 - Test 3 (Topics 36-45) (available 2:30 pm due by 11:59 pm on 12/03)

Thanksgiving break

week 15 - 11/30

Open Week for Conducting the Three Paper Reports

week 16 - 12/7

***Mon. 12/7 - Comprehensive Final Exam (Topics 1-45) (available 9 am due by 11:59 pm on 12/11)

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/studentGuidebook.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

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

ADA Statement
Students with Disabilities
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.