Spring 2-1-2022

BIOB 480.01: Conservation Genetics

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BIOB 480 Conservation Genetics

Instructor information

Instructor: Andrew Whiteley
Meeting times: MW 3:00 – 4:20
Location: LA 204
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Phone: (406) 243-6334
Office hours: Tuesdays 2-4p or by appointment

Note on mode of instruction due to ongoing coronavirus pandemic

We will begin this semester meeting Face-to-Face, There remains a possibility that we will meet via Zoom, depending on the effects of the omicron variant in Missoula. I will inform the class in advance, should we need to switch from Face-to-Face.

I understand these are very challenging times. Please do not hesitate to contact me if you are sick, dealing with sick friends or loved ones, or are otherwise struggling because of the pandemic. I will be available during my office hours, by appointment in person, by email, and we can set up Zoom meetings if needed, or we can talk by phone.

If you have any trouble accessing material, please let me know as soon as possible.

Course description

The objective of this course is to provide the genetic basis for solving biological problems in conservation. Major topics will include (1) the basics of population genetics, with emphasis on the genetics of small populations; (2) the application of molecular genetic techniques to conservation biology; and (3) the consideration of case studies of the application of genetics to conservation problems.

Learning Outcomes

1. You will understand the types of tools and data sets used in Conservation Genetics and Genomics
2. You will learn population genetic theory, including:
    a. Genetic drift, natural selection, effective population size, gene flow, and linkage disequilibrium
3. You will learn how to apply that theory to problems in conservation biology, including:
    a. Inbreeding depression
    b. Hybridization
    c. Defining units of conservation
    d. Genetic monitoring
    e. Conservation breeding
    f. Evolutionary adaptation to climate change

Required textbook

There is one required text

- *Conservation and the Genetics of Populations; 2nd Edition*, 2012, F. W. Allendorf, G. Luikart, and S. Aitken. Blackwell Publishing.

Class Resources

We will be using Moodle. Go there for lectures, assignments, announcements, and data sets. I will regularly communicate by email to your UM email address. **You are responsible for checking your UM email account regularly for messages containing information about the class.** We might use Socrative, an online poling app, for in-class quizzes. If we do, I will ask you to go to https://socrative.com/higher-ed/#login to download the app and create a student login. You will be able to use Socrative on your laptop, tablet, or smartphone.

Course Format

I will deliver lectures during the scheduled class meeting times. Each week (except for week 1), I will electronically hand out a problem set. This problem set will be handed out on Monday and be due by 5pm each Friday. Each problem set will correspond with that week's lecture materials. I will leave time during Wednesday's lectures to discuss that week's problems, answer questions, offer hints, and clear up any potential misconceptions.

Some of the problem sets will be hands-on activities that familiarize you with conservation genetic data sets, or will use computer simulations to deepen your understanding of basic population genetic theory in a conservation context. You will use freely available software or Microsoft Excel. More details about software for these activities will be provided in class.

Depending on the current COVID wave, we might shift to a more hands-on teaching format during the middle portion of the class. This will involve forming teams and doing in-class assignments and less time with me spent lecturing. There will also be reading check quizzes at the beginning of class, *if we make the switch to a more active learning model.* We will discuss this topic more extensively a few weeks into class.

Grading

Weekly Problem Sets	70% (14 problem sets, each worth 5% of your grade)
Final (Comprehensive)	25%
Class Participation	5%

Course Schedule: (subject to change; PS = Problem Set)

Week 1 (1/19)

- Introduction (Chapter 1)

Week 2 (1/24 – 1/26)

- Phenotypic variation (Chapter 2)
- Chromosomal variation (Chapter 3, Section 3.1)
- PS1 (Phenotypic Variation & Orang Chromosomes)

Week 3 (1/31 – 2/2)

- Genetic variation in natural populations – Proteins and mtDNA (Chapter 3, Section 3.2 – 3.4)
- Genetic variation in natural populations – Genetics to Genomics (Chapter 4)
- PS2 (Genetic Variation)

Week 4 (2/7 – 2/9)

- Hardy-Weinberg principle (Chapter 5)
- PS3 (Hardy-Weinberg)

Week 5 (2/14 – 2/16)

- Genetic drift (Chapter 6)
- PS4 (Genetic Drift)

Week 6 (2/23) (no class on Monday 2/21 due to President's Day)

- Effective population size (N_e) (Chapter 7)
- PS5 (Effective Population Size)

Week 7 (2/28 – 3/2)

- Effective population size (N_e)(Chapter 7)
- Natural Selection (Chapter 8)
- PS6 (Natural Selection)

Week 8 (3/7– 3/9)

- Population Subdivision (Chapter 9)
- PS7 (Population Subdivision)

Week 9 (3/14 - 3/16)

- Multiple Loci (Chapter 10)
- PS8 (Multiple Loci)

SPRING BREAK (3/21 – 3/24)

Week 10 (3/28 – 3/30)

- Quantitative genetics (Chapter 11)
- PS9 (Quantitative Genetics)

Week 11 (4/4 – 4/6)

- Inbreeding depression (Chapter 13)
- PS10 (Inbreeding Depression)

Week 12 (4/11 – 4/13)

- Demography and Extinction (Chapter 14)
- PS11 (Demography Extinction)

Week 13 (4/18 - 4/20)

- Metapopulations and Fragmentation (Chapter 15)
- Units of conservation (Chapter 16)
- PS12 (Metapopulation/Units of Conservation)

Week 14 (4/25 – 4/27)

- Hybridization (Chapter 17)
- Exploited populations (Chapter 18)
- PS13 (Hybridization/Exploited Populations)

Week 15 (5/2 – 5/4)

- Conservation breeding (Chapter 19)
- Climate Change (Chapter 21)
- PS14 (Conservation Breeding/Climate Change)

Finals Week (5/9 – 5-12)

- Final will be Tuesday 5/10 from 3:20 – 5:20

Required assignments and tests

- There will be a comprehensive in-person closed book final exam
- There will be a problem set (PS) each week (handed out Monday, due each Friday by 5pm)

Course guidelines and policies

Student Conduct Code

All students must practice academic honesty. You must turn in your own work for each problem set. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. If students are caught cheating or plagiarizing on an assignment, they will get a zero for the assignment. If students are caught cheating on more than one assignment or on an exam, they will fail the course.

Attendance

Lectures will be posted on Moodle. If you must be absent, please let me know so we can discuss what you might have missed.

COVID Guidelines

- Mask use is required within the classroom or laboratory.
- If you feel sick and/or are exhibiting COVID symptoms, please don't come to class and contact the Curry Health Center at (406) 243-4330.
- If you are required to isolate or quarantine, you will receive support in the class to ensure continued academic progress. You will be expected to complete weekly problem sets (available on Moodle) and to keep up with the readings and lecture material. Extended deadlines for problem sets will be discussed if they are needed.
- UM recommends students get the COVID vaccine and booster. Please direct your questions or concerns about vaccines to the Curry Health Center.
- Drinking liquids and eating food is discouraged within the classroom.
- Please note that there might be class sessions that are recorded. If this occurs, I will notify the class.

Course Withdrawal

Important Dates Restricting Opportunities to Drop a Course Spring 2022:

Deadline	Description	Date
To 15th instructional day	• Last day to drop individual classes on CyberBear with refund • Last day to withdraw from (drop all courses) with a partial refund – Withdrawal Policy linked below. • Last day to add classes with electronic override on CyberBear. • Last day to change credits in variable credit courses & switch grade mode in CyberBear. • Last day to change grading option to or from audit. • Last day to buy or refuse UM's student health insurance coverage.	February 7, @5 PM

Deadline	Description	Date
16th to 45th instructional day	• Course adds & drops require instructor's & advisor's approval using the Course Add/Change/Drop link in CyberBear. $10 fee applies per add or drop. • A 'W' will appear on the transcript for dropped classes. No refunds. • Students can change variable credit amounts and grading options (**except audit**) on eligible courses using the Course Add/Change/Drop link in CyberBear. • Last day to submit a Petition to Register & Pay After the Deadline for this semester.	February 8 – March 29 @5 PM
Beginning 46th instructional day	• Adds require instructor's & advisor's approval using the Course Add/Change/Drop link. $10 fee applies. • Drops require instructor's, advisor's, & Dean's approval via Course Add/Change/Drop link. $10 fee applies. • A 'WP' or 'WF' will appear on the transcript for dropped classes. No refunds. • Students can change variable credit amounts, or change grading options, (**except audit**) using the Course Add Change Drop link in Cyberbear.	March 30 – May 6 @5 PM

Accessibility, disabilities, and special accommodations:
The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and the Office for Disability Equity (ODE). If you anticipate or experience barriers based on disability, please contact the ODE at: (406) 243-2243, ode@umontana.edu , or visit www.umt.edu/disability for more information. Retroactive accommodation requests will not be honored, so please, do not delay. As your instructor, I will work with you and the ODE to implement an effective accommodation, and you are welcome to contact me privately if you wish. Any questions please contact me.

Grading policy

Final letter grades will be assigned as follows:

A = ≥ 92%	A- = 89-91%	
B+ = 87-88%	B = 82-86%	B- =79-81%
C+ = 77-78%	C= 72-76%	C- =69-71%
D + = 67-68%	D = 63-66%	D = 60-63%
F = <60%		