Spring 2-1-2018

BIOB 480.01: Conservation Genetics

Andrew Robert Whiteley
The University of Montana

BIOB 480 Conservation Genetics

Instructor information

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Office hours: Tuesdays 1-3p or by appointment

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
2. You will learn introductory population genetic theory
3. You will learn how to apply that theory to problems in conservation biology

Required textbooks

There is one required text

- *Conservation and the Genetics of Populations; 2nd Edition*, 2012, F. W. Allendorf, G. Luikart, and S. Aitken. Blackwell Publishing.
- I will be using an in-class polling system called Socrative (www.socrative.com)
    - You will use your smart phone, tablet, or laptop to answer Socrative polls
    - You will create a student account and login to room WHITELEY8414
    - More information will be provided

Class Resources

We will be using Moodle for class (BIOB 480.01-38318-Spring 2018). Go there for lectures, assignments, announcements, and data sets.

Computer Activities

Hands-on activities will allow you to become familiar with conservation genetic data sets, various computer programs, and simulations to deepen understanding of basic population genetic theory and links between population genetics in a conservation context. You will work in pairs or groups of three on activities throughout the semester. One member of the pair will need to have a laptop that he/she can regularly bring to class. You will use freely available software or Microsoft Excel. More details about software for these activities will be provided in class.

Group Papers

Groups of 2-3 students will write a paper on the conservation and genetics of a particular species or conservation genetics issue based on the current literature. Graduate students will be required to give a short oral presentation based upon their papers. Please refer to the separate handout for details about when paper assignments are due and topics I want you to cover. There will be assignments preparing you for the final draft of the paper throughout the semester.

Grading

Midterm I	15%
Midterm II	15%
Final (Comprehensive)	15%
Problem Set I	10%
Problem Set II	10%
Papers	15%
Activities	15%
Class Participation	5%

Course Schedule: (subject to change, problem sets, exams, and other submitted items are in bold)

Week 1 (1/22 – 1/26)

- Introduction (Chapter 1)
- Phenotypic variation (Chapter 2)
- Chromosomal variation (Chapter 2, Chapter 3, Section 3.1)

Week 2 (1/29 – 2/2)

- Genetic variation in natural populations – Proteins to Genomics (Chapter 3, Section 3.2 – 3.4; Chapter 4)
- Introduction to genetic and genomic data sets
- **Submit species and concepts for group papers via Moodle – Due February, 2nd by 5pm**

Week 3 (2/5 – 2/9)

- February 5th: Guest Lecture from Dr. Antoinette Kotze, National Zoological Gardens, South Africa
- Hardy-Weinberg principle (Chapter 5)
- Hardy Weinberg activity
- **Problem Set (PS) 1 handed out (Monday February 5th)**

Week 4 (2/12 – 2/16)

- Genetic drift/Bottlenecks (Chapter 6, Sections 6.1 – 6.4)
- Effective population size (N_e)/Effective number of breeders(N_b)(Chapter 7)
- Genetic drift activity
- **PS1 due (Wednesday February 14th)**
- Hand out practice exam 1

Week 5 (2/19 – 2/23)

- No Class on 2/19 (President's Day)
- Effective population size (N_e)/Effective number of breeders(N_b)(Chapter 7)
- Effective population size activity

Week 6 (2/26 – 3/2)

- **Exam 1 (Monday February 26th)**
- Natural selection (Chapter 8)
- Natural selection activity

Week 7 (3/5 – 3/9)

- Population subdivision (Chapter 9)
- Population subdivision activity
- **Submit outline of paper via Moodle – Due March 9th by 5pm**
- **Handout PS2 (Monday March 5th)**
- Hand out practice exam 2

Week 8 (3/12 – 3/16)

- Linkage disequilibrium (Chapter 10)
- Quantitative genetics (Chapter 11)
- **PS2 due Wednesday March 14th in class**

Week 9 (3/19 – 3/23):

- Inbreeding depression (Chapter 13)
- **Exam 2 (Wednesday March 21st)**

Week 10 (3/26 - 3/30) Spring Break, no class

Week 10 (4/2 – 4-6)

- Demography and Extinction (Chapter 14)
- Genetic rescue case study

Week 11 (4/9 – 4/13)

- Metapopulations and fragmentation (Chapter 15)
- Units of conservation (Chapter 16)

- **Submit draft version of paper via Moodle – Due Friday April 13th by 5pm**

Week 12 (4/16 – 4/20)

- Hybridization (Chapter 17)
- Exploited populations (Chapter 18)
- Guest lecture on hybridization

Week 13 (4/23 - 4/27)

- Conservation breeding (Chapter 19)
- Invasive species (Chapter 20)
- Genetic identification and monitoring (Chapter 22)

Week 14 (4/30 – 5/4)

- Climate Change (Chapter 21)
- **Graduate Student Presentations on 5/2 (last day of class)**
- **Final papers due on 5/2**

5/7 3:20-5:20p (Finals week): Final exam will cover lectures and assignments from the entire semester. **NO EARLY EXAMS WILL BE GIVEN**

Required assignments and tests

- There will be two exams and a comprehensive final
- There will be two problem sets
- Activities will be assigned throughout the semester, either in class or out of class. Due dates will be provided with the activity
- There will be a final group paper (and presentations for graduate students only)
- Papers from the primary literature may be assigned occasionally

Course guidelines and policies

Student Conduct Code

All students must practice academic honesty. 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

If you need to miss a class, please get notes from another student, perform the readings, review the notes and then come into my office hours with questions regarding the material.

Course withdrawal

Important Dates Restricting Opportunities to Drop a Course Spring 2018:

Deadline	Description	Date
To 15th instructional day	Students can drop classes on CyberBear with refund & no "W" on Transcript	February 9 = last day
16th to 45th instructional day	A class drop requires a form with instructor and advisor signature, a $10 fee from registrar's office, student will receive a 'W' on transcript, no refund.	February 10 through April 2
Beginning 46th instructional day	Students are only allowed to drop a class under very limited and unusual circumstances. Not doing well in the class, deciding you are concerned about how the class grade might affect your GPA, deciding you did not want to take the class after all, and similar reasons are not among those limited and unusual circumstances. If you want to drop the class for these sorts of reasons, make sure you do so by the end of the 45th instructional day of the semester. Requests to drop must be signed by the instructor, advisor, and Associate Dean (in that order) and a $10 fee applies. Instructor must indicate whether the individual is Passing or Failing the class at the time of request.	April 3 – May 4

Disability modifications

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

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%		