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Spring 2-1-2017

### BIOB 480.01: Conservation Genetics

Andrew Robert Whiteley  
*The University of Montana*

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# BIOB 480 Conservation Genetics

## Instructor information

Instructor: Andrew Whiteley  
Office: Bio-Research Building (BRB) 004  
Email: andrew.whiteley@umontana.edu  
Phone: (406) 243-6334  
Office hours: M 1-3pm

## 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; 2<sup>nd</sup> Edition*, 2012, F. W. Allendorf, G. Luikart, and S. Aitken. Blackwell Publishing.
- I would like to use an in-class polling system but will assess how well this will work on the first day of class
  - If we go this route, you might be required to bring a polling device to class

## Class Resources

We will be using Moodle for class (BIOB 480.01-34797-Spring 2017). Go there for lectures, assignments, announcements, and data sets.

## Computer Activities

Hands-on activities 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 either Microsoft Excel or software that is otherwise freely available. More details about software for these activities will be provided in class.

## Group Presentations

You will prepare and deliver short group presentation during the final week of class. Your presentation will be on the conservation and genetics of a particular species based on the current literature. More details will be provided at the beginning of the course. Please refer to the separate handout for details about when presentation assignments are due and how topics I want you to cover. There will be assignments preparing you for this presentation throughout the semester.

## Grading

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

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

**Week 1 (1/23 – 1/27)**

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

**Week 2 (1/30 – 2/3)**

- Genetic variation in natural populations – Proteins to Genomics (Chapter 3, Section 3.2 – 3.4; Chapter 4)
- Introduction to genetic data sets (Genepop on the Web)
- **Submit species and concepts for group presentation via Moodle – Due February, 1<sup>st</sup> by 5pm**

**Week 3 (2/6 – 2/10)**

- Hardy-Weinberg principle (Chapter 5)
- Genetic drift (Chapter 6, Sections 6.1 – 6.4)
- Hardy Weinberg activity (Excel)
- **Problem Set 1 handed out (Monday February 6<sup>th</sup>)**

**Week 4 (2/13 – 2/17)**

- Genetic drift/Bottlenecks (Chapter 6, Sections 6.5 – 6.7)
- Effective population size ( $N_e$ )/Effective number of breeders( $N_b$ )(Chapter 7)
- Genetic drift activity (Tiago's software)
- **Problem Set 1 due (Wednesday February 15<sup>th</sup>)**
- Hand out practice exam 1

**Week 5 (2/20 – 2/24)**

- Effective population size ( $N_e$ )/Effective number of breeders( $N_b$ )(Chapter 7)
- Effective population size activity (Excel)

**Week 6 (2/27 – 3/3)**

- **Exam 1 (Monday February 27<sup>th</sup>)**
- Natural selection (Chapter 8)
- Natural selection activity (Tiago's software)

**Week 7 (3/6 – 3/10)**

- Population subdivision (Chapter 9)
- Population subdivision activity (Tiago's software)
- **Submit outline of presentation via Moodle – Due March 6<sup>th</sup> by 5pm**

**Week 8 (3/13 – 3/17)**

- Linkage disequilibrium (Chapter 10)
- Quantitative genetics (Chapter 11)
- Hand out practice exam 2

**3/20 – 3/24: Spring Break, no class**

**Week 9 (3/27 - 3/31)**

- Genetic identification and monitoring (Chapter 22)
- Inbreeding depression (Chapter 13)
- Guest lecture on inbreeding

**Week 10 (4/3 – 4-7)**

- **Exam 2 (Monday April 3<sup>rd</sup>)**
- Demography and Extinction (Chapter 14)
- Genetic rescue case study

**Week 11 (4/10 – 4/14)**

- Metapopulations and fragmentation (Chapter 15)

- Units of conservation (Chapter 16)
- **Submit draft version of presentation via Moodle – Due Friday April 14<sup>th</sup> by 5pm**

**Week 12 (4/17 – 4/21)**

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

**Week 13 (4/24 - 4/28)**

- Conservation breeding (Chapter 19)
- Invasive species (Chapter 20)
- Guest lecture on conservation breeding

**Week 14 (5/1 – 5/5)**

- Climate Change (Chapter 21)
- **Presentations on 5/3 and 5/5 (last two days of class)**

**Finals week: Final exam** will cover lectures and assignments from the entire semester. Date and time to be determined. **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
- In class activities will be due the following Monday if they are not completed in class
- There will be a final group presentation

**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 2017:

<b>Deadline</b>	<b>Description</b>	<b>Date</b>
To 15 <sup>th</sup> instructional day	Students can drop classes on CyberBear with refund & no "W" on Transcript	February 10 = last day
16 <sup>th</sup> to 45 <sup>th</sup> 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 11 through April 3
Beginning 46 <sup>th</sup> 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 45 <sup>th</sup> 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 4 – May 5

**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 = $\geq$ 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%		