

Conservation Genetics (WLF 540)
College of Natural Resources, University of Idaho
On campus and online | Fall 2015, 1-3 Credits
Tuesday and Thursday 12:30 p.m. – 1:45 p.m., CNR 14

Instructors:

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Course Description: The application of molecular genetic methods has become increasingly important in the conservation and management of fish, wildlife and plant species. This course is designed to help students learn the basic principles of population genetics and phylogenetics as they are applied in the fields of conservation genetics and conservation genomics. Students will learn to design conservation genetics research projects, interpret genetic data and critically review papers from a wide-range of important topics in conservation genetics and genomics.

Course Format: This course will be taught in person on the UI campus, through simultaneous webcast, and videos of lecture will be saved and posted for online students. The class is designed as three one-credit modules (introduction to conservation genetics, advanced topics in conservation genetics and conservation genomics) giving students the option to take 1 – 3 credits depending on time and interest. See page 2 for detailed schedule and list of topics.

Course delivery: [Blackboard learn](#)

Textbook: Conservation and the Genetics of populations 2nd edition. 2013. Allendorf, Luikart, Aitken, Wiley-Blackwell. We will also assign papers from the primary literature for most classes.

Learning Outcomes:

- 1) Obtain a comprehensive overview of the fields of conservation genetics and genomics
- 2) Develop the knowledge and skills to critically evaluate the conservation genetic literature and to design research projects
- 3) Gain experience and skill in interpreting genetic data and results and applying findings in a management context
- 4) Improve written communication skills

Grading:

Your grade will be based on the following items. 1 credit only – homework assignments (80%) and class participation (20%). 2-3 credits – Review paper or class lecture (40%), homework assignments (40%) and class participation (20%)

Optional computer-based data analysis lab WLF 549 Wed 12:30 – 2:20 Life Sciences 440 (1 credit) – if enough interest

Class Schedule by Module

Module 1 – Introduction to Conservation Genetics

<u>Date</u>	<u>Topic</u>
Aug 25	Intro to Conservation Genetics/Molecular Methods
Aug 27	Intro to Conservation Genetics/Molecular Methods
Sept 1	Intro to Phylogenetics
Sept 3	Intro to Phylogenetics
Sept 8	Gene Trees, Species Trees, and Species Delimitation
Sept 10	Barcoding and Phylogenetic Diversity Metrics
Sept 15	Phylogeography
Sept 17	Intro Pop Genetics – Hardy Weinberg Equilibrium, linkage equilibrium, measuring genetic diversity
Sept 22	Intro Pop Genetics – effective population size, drift, selection
Sept 24	Diversity and Fitness – Genetic Rescue

Module 2 – Advanced Topics in Conservation Genetics

<u>Date</u>	<u>Topic</u>
Sept 29	Hybridization – Outbreeding Depression
Oct 1	Gene Flow/Genetic Structure
Oct 6	Detecting genetic structure and migrants using assignment tests and Bayesian clustering
Oct 8	Defining populations and management units
Oct 13	Defining Evolutionary Significant Units
Oct 15	Non-invasive genetic sampling approaches
Oct 20	Aquatic environmental DNA surveys
Oct 22	Assessing mating systems/parentage
Oct 27	Landscape genetics
Oct 29	Genetic monitoring

Module 3 – Conservation Genomics

<u>Date</u>	<u>Topic</u>
Nov 3	Overview of Conservation Genomics
Nov 5	Next-Generation Sequencing Technologies
Nov 10	Identifying adaptive genes: Whole Genome Sequencing (WGS)
Nov 12	Identifying adaptive genes: RADseq & SNP Chips
Nov 17	Mapping adaptive genes: QTL's & GWAS
Nov 19	Adaptation & demography over time: WGS & DNA Capture
Nov 24-6	Thanksgiving break
Dec 1	Tracking introgression and hybridization
Dec 3	Monitoring biodiversity: Metagenomics & Metagenetics
Dec 8	Ecotoxicity testing: Transcriptomics
Dec 10	Identifying non-genetic adaptive mechanisms: Epigenetics

Each module is 1 credit and students can register for 1 – 3 credits and attend only the module or modules that are of interest.