Summer Session 2024

BIOE 440 Conservation Ecology
Syllabus

3 credits; Lectures, Labs, Field Work
Course dates: June 17–28, 2024
Instructor: Dr. Gordon Luikart
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https://flbs.umt.edu/newflbs/about-flbs/people/

Prerequisites: One semester of college-level biology and an ecology course (can be met via BIOE 342 Field Ecology at FLBS) or equivalents; or consent of instructor.

Level: U/G offered for undergraduate and graduate credit (see graduate increment page 4)

Course Description:
This course will emphasize the application of basic biological research to problems in conservation and management with an eye toward the interface between science, human dimensions, and policy. We also emphasize the three main disciplines/areas in conservation biology: Ecology, Evolution, and Human Dimensions. There will be four primary themes to the course: the effects of introduced (invasive) species on biodiversity; population abundance and connectivity; units of conservation and the ESA (Endangered Species Act); and general organismal field ecology. These themes will be applied to a variety of case studies that have been chosen to illustrate general principals and important issues in conservation and to facilitate discussions with professional field/conservation biologists. Most of our time will be spent meeting in the field with professional conservation biologists who work for governmental or non-governmental organizations. These meetings represent a very **special opportunity** to 'interview', learn from, and work with multiple researchers and natural resource managers from multiple state and federal agencies (USGS, Montana FWP, US Forest Service, National Park Service).

Student Learning Objectives:
At the end of the course, you will be able to:

1) Compare and contrast conservation biology from other scientific and management disciplines.
2) Identify 6 major principles or concepts of ecological, evolutionary, and genetic science that are critical to the conservation and restoration of biota.
3) Describe the complexities, challenges, and benefits of conservation biology and of being a conservation ecologist including both natural systems and human systems/dimensions.
4) Differentiate among the conservation practices of protection, restoration, and remediation.
5) Recall the basic requirements for protection of biodiversity and biological integrity of major US environmental laws including the Endangered Species Act (ESA), The National Environmental Policy Act, and the Clean Water Act.
6) Articulate detailed arguments for and against conservation decisions including whether to list or not list species under the ESA.
7) Describe field observations in a standard field notebook format.

8) Recognize principle threats to conservation and restoration of native species, habitats, and ecosystems in northwestern Montana and the Crown of the Continent Ecosystem including the impact of introduced species
9) Evaluate population abundance data and connectivity data collected with a variety of methods to assess population status and trends.
10) Describe the major threats and drives of species extinction including habitat degradation, climate change, invasive species (including diseases and parasites).
11) Interpret field observations and scientific literature, and recognize how to apply it when formulating a field study or conservation program.
12) Discuss how the precautionary principle can inform the conservation decision-making or policy.
13) Explain why an interdisciplinary approach (involving the domains of policy, economics, culture, ethics and science) is vital to the conservation decision-making process.
14) Illustrate with examples how scientific information and analysis can be used to formulate and inform practices and policies to achieve conservation goals in the face of critical uncertainties, and in a way that openly responds to social considerations.

Expected Outcomes:
This course will emphasize biological principles, scientific concepts, and the synthesis of information. Expected outcomes are:

1) to understand the biological basis of conservation biology including the complexity of both the natural systems and human dimensions (and the 3 main disciplines/areas)
2) to understand the relationship between science and public policy
3) to understand and appreciate the roles of practicing conservation biologists, and
4) to read scientific publications and ***ask questions*** about the research and conservation management in each paper.

Required Text: We will read parts of the following text: Principles of Conservation Biology. 3rd edition. 2006. Groom et al., Sinauer Publ. Copies will be available in the classroom.

Reference Texts: Electronic and hard copies of reference readings will be provided by the instructor. This course will emphasize readings from the primary literature. A paper or two will be assigned to read, prior to each field trip, related to the concepts that will be emphasized during that field trip. Students are expected to read the assigned reading prior to the field trip. Identification guides to local biota will be available; students are strongly encouraged to bring personal copies of field guides for mammals, amphibians, fishes, flowers, trees, and other biota in the northern Rocky Mountains region of the USA.

Course and Field Supplies/Equipment: (*available for purchase at the FLBS Bookstore)
Students must be prepared for spending time in the field. It is important that students adequately prepare for field trips by making certain they have the appropriate equipment and resources for the trip. Weather in the N. Rockies is highly variable and can change quickly so students should always carry layers for warmth and rain gear. Students should bring the following supplies:

REQUIRED	OPTIONAL BUT DESIRABLE
Rite in the Rain field notebook with pencils Hiking boots Good water shoes for fording streams and rivers Day pack (backpack, fanny pack, or bum bag) to carry lunch, rain gear, notebook, etc. Field clothing for overnight trips Warm jacket (and layers, e.g., fleeces) as it can snow in June/July! Rain gear Hat for field use Insect repellent Personal containers (water bottles) to hold 2 liters of drinking water Sandwich size crush proof Tupperware for lunch sandwich Sleeping bag and sleeping pad (with small pillow?) Personal tent (highly water proof) Personal mess kit – plate, cup, bowl, silverware Headlamp and extra batteries Loose fitting cloths (**crucial** to prevent insect/ mosquito bites)	Waders (hip waders, if possible, for sampling toads, fish, & aquatic insects on week 2) Lap top computer (to transcribe field journal to computer files, in evenings) Camera and film or memory chip Binoculars Sun screen and sun glasses Bear spray Map (Glacier Park trails and day hikes) Sandals or shoes for when in camp (avoid flip flops which are not allowed on hikes or walks) Fishing rod with flies, spinners

- REQUIRED Overnight Field Gear and Other Items to Bring Checklists: http://flbs.umt.edu/urls/lists

Grades, Assignments, and Exams:
Brief reading & writing assignments on evening of day 1 (5% of course grade)
Mid-term oral or written exam at the end of week 1 (15%)
Group project oral presentation and written report (25%)
Field journal (15%) (see example journal entries in Journal handout)
Final exam (20%)

Participation and enthusiasm (20%) (e.g., having a positive attitude, being on time, helping others learn, and interacting politely/respectfully with guest speakers is crucial to your success and the success of the class)

Exams will be designed to encourage synthesis of subject matter and **not** to test your ability to recall details. In addition, the Field Journal writing is designed to develop your skills of observation in nature and keeping detailed field notes. A good deal of time will be spent reading publications relating to the research of the biologists we will meet. Students are expected to be **very thankful**, polite, attentive, ask questions, and demonstrate knowledge (e.g., of the literature) when meeting with biologists. Positive attitude, enthusiasm, and professionalism are important!

Graduate Increment:
Students taking this course for graduate credit must complete two additional assignments:
- Develop and present a classroom or field lecture or activity (e.g., data collection or data presentation and analysis) that elaborates and illustrates concepts from one of the field activities or assigned readings.
- Lead discussion of one scientific publication related to topics of a guest lecturer.

Course Policies:
Students are expected to review and adhere to the University of Montana Student Code of Conduct and adhere to the Flathead Lake Biological Station Code of Conduct form signed during student registration. Students must also abide by the FLBS Rules and Regulations and the Safety Orientation Checklist. Students must complete the University of Montana online Prevention Education Programs: AlcoholEdu and Sexual Assault Prevention for Adult Learners.

Schedule: The schedule may change prior to first day of class and while class is in session due to location availability and field conditions.

Note: Make sure you pack your brown bag lunch each day at breakfast!

Date	Location	Lectures/Lab/Field Work	
Monday	FLBS	8:30 am 9:00 am 10:30 am 1:00-3:00 pm 3:30-5:00 pm 6:00-8:00 pm	Introduction, business Lecture: Cons Biol Lecture: Biodiversity Read then discuss: E.O. Wilson 2002, 2016 Student PowerPoint on an organism of choice Assignments
Tuesday	FLBS, Wayfarer's SP	6:30 am 10:00 am 2:00 pm 5:30 pm Read papers (hatchery/ hybrids; floodplain biodiversity), write journal	Megan Fylling, UM Netting, banding birds Megan, Avian ecology & conservation lecture Wayfarer's State Park, talk with Beth G, invasive lake trout Dinner at FLBS
Wednesday	Sekokini Spgs (Blankenship Rd, near Lake Five, Coram) GNP	8:00 am 10:00-12:00 Noon 2:30-4:00 pm 7:00 pm **Overnight Camping at Two Medicine Campground, GNP**	Leave for Sekokini Springs hatchery Matt Boyer FWP, ESA, fish restoration Rachel Malison UM, Nyack Floodplain insect biodiversity Steve Amish UM, eDNA sampling for biodiversity & AIS monitoring
Thursday	GNP	8:00 am 1:00-3:00 pm 5:00 pm **Overnight Camping at Two Medicine**	Clint Muhlfeld USGS, Cutthroat trout eFishing, DNA sampling, Rose Creek, Glacier Park Joe Giersch USGS, Glacial stonefly sampling, Lunch Creek Camp with Leah Joyce UM (amphibian biologist)
Friday	GNP	8:00 am Midterm Exam: Email to Gordon by 9:00 pm Weekend Notes: Field journals email to Gordon by Saturday at 12noon	Leah Joyce, UM, Amphibian capture, tagging, mark-Recapture, chytrid sampling, conservation

Date	Location	Lectures/Lab/Field Work
		Weekend: Work on group papers (Title, Intro, Fig., Lit Cited) 5:30 pm Dinner at FLBS
Monday	FLBS	TBD
Tuesday	GNP	8:00 am Leave for GNP 9:30 am Kate Kendall USGS, Griz ecology & management 6 pm Discuss papers **Overnight Camping at Diane's cabin, North Fork**
Wednesday	GNP	8:00 Collin Peterson, Moose & Ungulate Ecology 1:00 pm Find wolf dens near Dover Spike North Fork, GNP Diane Boyd FWP/UM, Carnivore ecology, wolves, policy, advocacy, telemetry 2:30-5:00 pm Dawn Lafleur GNP, Native plant restoration & invasive species 5:30 pm Dinner at camp **Overnight Camping at Diane's cabin, North Fork**
Thursday	FLBS	8-10 AM Research to outline/draft PowerPoint, & paper 10:00-12:00 Noon Get comments on your paper draft (and slides) from Gordon 9:00 pm Finished field journal and email to: gordon.luikart@umontana.edu
Friday	FLBS	11:00 am PowerPoint Presentations (5 minutes each team) 3:00 pm Final Exam 5:00 pm Paper (final) emailed to Gordon by 5:00 pm

Students with disabilities may request reasonable modifications by contacting the instructor. The University of Montana assures equal access to instruction for students with disabilities in collaboration with instructors and the Office for Disability Equity. The University does not permit fundamental alterations of academic standards or retroactive modifications. If you have a disability that adversely affects your academic activities, please let us know at summersession@flbs.umt.edu so we can discuss an accommodation.