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University of New Orleans Syllabi

Fall 2015

BIOS 4534

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University of New Orleans

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This is an older syllabus and should not be used as a substitute for the syllabus for a current semester course.

Conservation Biology
BIOS 4534
Fall 2014

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Office hours: Tuesdays, Wednesdays and Thursdays 1.00 – 3.00 pm, or by appointment

SECTION I: The Basics.

This section will cover the general concepts of conservation biology and examine how the basic principles of genetics, ecology and evolutionary biology are applied to conservation practice.

Week 1: General introduction to conservation biology (August 19, 21)

    a) Scope of the course
    b) What is conservation biology?

Groom: Chapter 1; Chapter 2 pp. 27-39
LAB: Critical analysis of a scientific paper.

Week 2: Conservation genetics (August 24, 26, 28)

    a) Questions that can be addressed with genetic tools
    b) Quantifying genetic variation
    c) Principles of population genetics
    d) Bottlenecks and inbreeding

Groom: Chapter 11
LAB: Population genetics of small populations using POPULUS and calculation of inbreeding coefficients in a captive bat population [AMNH exercise]

Week 3: Taxonomy, phylogeny and conservation units (August 31, September 2, 4)

    a) Taxonomy and classification
    b) Phylogenetic systematics
    c) Evolutionary significant units (ESUs)
    d) Applications to conservation

Futuyma: Chapter 5: pp. 87-98
Ridley: Chapter 15: pp 423-449; Chapter 16: 471-474.
LAB: Sequence alignment and phylogenetic analysis with MEGA

LABOR DAY HOLIDAY September 7th
** No class **

Week 4: Population biology and applied demography (Sept 9, 11)

     b) Definition and study of populations
     c) Estimation of animal densities
     d) Basic demography
     e) Models of population growth

Krebs: Chapter 9: pp 116-132; Chapter 10: 133-149.
LAB: Line transect census sampling methods at Lafitte National Park (field excursion) September 11th

Week 5: Species biodiversity (Sept 14, 16, 18)

     d) Species concepts
     e) Measuring species diversity
     f) Global patterns of species richness
     g) Assigning conservation priority

Groom: Chapter 2 pp 39-62; Chapter 6 pp 197-200
LAB: Analysis of field data collected at Lafitte using DISTANCE

Week 6: Community and ecosystem diversity (Sept 21, 23, 25)

     a) Communities and ecosystems
     b) Ecosystem functions and services
     c) Species versus ecosystem approaches
     d) Ecological consequences of extinction

Groom: Chapter 13
LAB: Canoe trip to Pass Manchac. Field excursion September 25th

**** MID-TERM MONDAY September 28th****

SECTION II: Extinctions past and present.

This section explores the problems inherent to small populations and examines factors contributing to the current biodiversity crisis.

Week 7: Extinction (September 30, October 2)

     a) Extinction as a historical process
     b) The biodiversity crisis and major threats
     c) The concept of rarity
     d) Why some species are more susceptible to extinction

Groom: Chapter 3
LAB: Threat analysis using the IUCN red data book database

Week 8: Population viability analysis (Oct 5, 7, 9)

    a) Minimum viable populations
    b) Genetic, demographic and environmental stochasticity
    c) Vortex: modeling the probability of extinction
    d) Case studies

Groom: Chapter 12 pp. 419-435
LAB: Population viability analysis using VORTEX

Week 9: Ecosystem fragmentation and loss (October 12, 14)

    a) Ecosystem degradation and loss
    b) Environmental pollution
    c) Fragmentation and its effects
    d) Biological impacts of climate change

Groom: Chapter 6 pp173-196; Chapter 7
LAB: None

***** FALL BREAK: OCTOBER 15-16 ******

SECTION III: Conservation management applications

This section will explore several important applications to conservation theory and the major challenges that conservation managers face. Topics include population viability analysis, management of captive populations and species reintroductions, sustainable use of natural resources, invasive species management and reserve design.

Week 10: Applied population management (October 19, 21, 23)

    c) Management of captive populations
    d) Re-introduction and translocation
    e) *Ex situ* conservation strategies
    f) Reproductive technologies

Primack: Chapter 13, 14.
LAB: Field trip to the Audubon Centre for Research on Endangered Species (ACRES) Field excursion October 23.

Week 11: Sustainable management of natural resources (October 26, 28, 30)

    a) Over-exploitation and the tragedy of the commons
    b) Sustainable harvesting
    c) The bushmeat crisis in central Africa
    d) World fisheries

Groom: Chapter 8
LAB: VORTEX group work

Week 12: Invasive species management and wildlife diseases (November 2, 4, 6)

   a) What is an invasive species?
   b) Ecology and management of invasive species
   b) Emerging infectious diseases
   c) Discussion of case studies

Groom: Chapter 9
LAB: Using MAXENT to model predicted species distributions

Week 13: Protected area design and selection (November 9, 11, 13)

   c) Habitat islands and island biogeography
   d) Principles of reserve design
   e) Protected area selection
   f) Ecological restoration

Groom: Chapter 14; Chapter 15 pp 553-565
LAB: VORTEX group work

SECTION IV: The bigger picture.

This final section will address the economic and societal implications of conservation and examine species and ecosystem protection in the domestic and international arena.

Week 14: Conservation law and policy (November 16, 18, 20)

   a) U.S. Environmental Law
   b) The Endangered Species Act
   c) Habitat conservation planning
   d) Major international treaties

Van Dyke: Chapter 2: pp 28-52
LAB: Negotiating an international treaty

Week 15: Climate change (November 23, 25)

   a) Inter-Governmental Panel on Climate Change
   b) Current and projected change across the world
   c) Implications for species and ecosystem conservation
   d) The way forward

THANKSGIVING BREAK NOVEMBER 26, 27

Week 15: Presentation of group VORTEX projects (November 30, December 2, 4)
LAB: Group presentations and wrap up

*******************FINAL EXAM*****************

Grading

Mid-term exam:	15 %
Final exam:	15 %
Class participation/discussion:	10 %
Lab exercises	20 %
Group research project:	20 %
Individual presentation:	10 %
Conservation policy brief	10%

Grading and course policies

Your grade will be based on the seven items listed above. The following is an indication of how grades will be assigned:

90% and above	A
80-89%	B
70-79%	C
60-69%	D
Below 60%	F

Assigned homework MUST be handed in on the appointed day or a grade will be docked off your score for each day past the due date. Exceptions will only be made in the case of an excused absence due to extenuating circumstances or illness.

Assigned text book readings and exams

The OPTIONAL text for this course is *Principles of Conservation Biology* by Martha Groome, Gary Meffe and Ronald Carroll (third edition). The text in these books is intended as a reference source and a copy will be made available through Moodle. Supplementary reading for weeks where there is no reference book chapter will be made available to the class a week in advance via Moodle. For both exams (mid-term, final) you will be tested on material covered in class and lab but you may also be tested on material from the assigned readings and articles discussed in class.

Discussion of the primary literature

You will also be required to read and discuss at least one article from the primary literature each week. The relevant pdf will be made available through the Moodle website a week in advance of the discussion period. Students are expected to have read the assigned article before class and should be able to demonstrate that they have read the assigned readings and are prepared with comments or questions. There will also be questions on these assigned readings in both the mid-term and final exam.

Lab exercises and field trips

A lab will be held once week to illustrate key concepts in lectures and to give students hands on experience in field work and working through modeling, data analysis and problem-solving exercises. Classroom exercises will either be based on: (i) database use and writing/discussion (ii) spread-sheet based exercises (iii) modeling exercises built around available software such as POPULUS, MEGA, VORTEX and MAXENT (iv) classroom exercises developed by the Center for Biodiversity and

Conservation of the American Museum of Natural History (AMNH) or (v) field trips and analysis of data. The following two sources have also been used as inspiration for these exercises:

Assignments will be handed out at the beginning of each lab and students will use the lab period to work through an assigned problem set or computer-based exercise. Students will be given a week to complete these exercises and hand them in for grading. This class will also involve some outdoor field work and class trips where a report of analysis of field collected data may be required, depending on the trip. If no analysis or report is required, an additional background reading relating to the field trip may be assigned.

Group research projects and individual presentation

Students will be asked to work together in small groups (3 students per group) on a research project that involves the use of simulation software (VORTEX) to conduct a Population and Habitat Viability Analysis (PHVA) of an endangered species of your choice. PHVAs are widely used by conservation professionals to predict extinction probabilities in endangered species. The software itself is very flexible and allows the user to model a wide range of realistic threat scenarios including natural catastrophes, habitat loss and hunting. Identification of focal species should be a group undertaking and group members are responsible for dividing up the necessary research and data analysis. Students will be encouraged to research the basic data for their model and draw from the available scientific literature resources.

An outline of the group project and tasks of each member of the group must be submitted to me by the mid-term exam. Comments on this outline will then be given back to each research group as a guide for further research and data analysis. Assessment of group projects will be based on the final project report and the quality of each of the individual presentations. Grading for this project will be 20% for the final report and 10% for group presentations at the end of the semester.

Conservation policy brief

Everyone in the class will be required to give a five minute policy brief on a conservation issue you have read about in the local and national papers or in a magazine. In preparing your policy brief, you will also be expected to draw on information from one or two papers in the scientific literature that relate directly to this issue. You will then have a week to write up a one page presentation and provide evidence of your sources (e.g. citations). You can make your presentation anytime during the semester except the final week. In making your presentation, do NOT read what you plan to hand in but give an outline in your own words and make sure you keep your presentation to 5 minutes.

Field trips

Several field trips are planned for this semester. These trips may in some cases extend beyond the assigned lab time so please make sure you plan your return time accordingly. If you have problems please do consult me ahead of time. Equipment for these field trips will be provided although you should wear appropriate clothes for field work including sensible shoes, long pants, hat, sun screen and gloves. Detailed information for each field trip will be provided in class the week before.

Learning goals:

- Understand the basic principles of conservation biology and evaluate how these principles are applied to problems in conservation
- Read the assigned literature and be able to critically assess the key concepts in a discussion and written format
- Demonstrate how to research data, work through spread-sheet exercises and manipulate software applicable to solving conservation problems
- Co-design an original research project and work effectively as a team member in a group environment
- Demonstrate an ability to effectively communicate research findings and key concepts through both oral and written presentation

Attendance:

Attendance is mandatory unless a leave of absence is granted in advance. Students that fail to attend more than three classes will drop a grade in their participation assessment.

Academic dishonesty:

In group research students are encouraged to consult with and work with their peers. However assessed work must be individually written and duplicate answers to assignments will not be accepted. Plagiarism is never tolerated and all points for a given question will be deducted from any lab assignments or exams if students are found to have copied their work from another source, published or otherwise.

Students with certified disabilities:

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities must arrange these accommodations with the Office of Disability Services (room 260 University Center, phone 280-6222) and with the instructor.