Syllabus, BIO 22800. Ecology and Evolution, 4 credits, Spring 2008

Lecture: Wednesday, 6:30–8:10 p.m., Room MR-417A
Laboratory: Section 1GW: Monday, 6:10–10:00 p.m., Rooms MR-822/MR-819
Section 3EG: Wednesday, 2:00–5:50, Rooms MR-822/MR-819
Course webpage: http://web.sci.ccny.cuny.edu/~anderson/teaching/eespring08/

Catalog description: Introduction to the basic principles of ecology and evolutionary biology emphasizing quantitative approaches and hypothesis testing. Computer literacy is attained using spreadsheets and the internet.

Prerequisites and co-requisites: Bio 206 (Genetics) is a prerequisite to Bio 228, and Math 209 (Calculus and statistics) is a co-requisite; Math 209 and Bio 228 are designed to be taken together.

Hours/credits: 4 credits; 6 hours per week (2 hours lecture, 4 hours laboratory)

Lecture instructor and course coordinator: Dr. Robert P. Anderson, Assistant Professor, City College of CUNY
Office: J-817 Marshak Science Building; Telephone: 212-650-8504
Office hours: Wednesday,10:00 a.m.–1:00 p.m. or by appointment (MR-817 or MR-810)
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Laboratory instructor: TBA

Textbook, required: Krohne, D.T. 2001, *General Ecology*, 2nd edition. Brooks/Cole, Pacific Grove, CA. ISBN 0-534-37528-6

Laboratory manual: Gallagher, J.C. and O'Connor, T. (editors) 2003. *Laboratory Manual for Ecology and Evolution*. City College of New York, New York, NY. [Note: we will modify many of the laboratory exercises in the manual; see the particular pages assigned for each lab.]

Course objectives (overview and philosophy): Ecology and Evolution examines a spectrum of biological processes, with emphasis on their application to the population and community levels of organization. The course combines conceptual and quantitative approaches to topics including ecology, ecosystems, biogeography, genetics, evolution, and systematics, as these areas apply to populations and communities of organisms. The laboratory is a series of exercises and experiments designed to introduce students to data collection and analysis, including interpretation of laboratory and field experiences. This course will also cover current environmental issues critical to modern society. Major topics to be covered include: Niche, population growth, species interactions, community structure/succession, global climate and biomes, species richness and diversity, fitness and selection, genetic drift, phylogeny, speciation, and comparative biology.

Course objectives After completing this course, students should be able to:
1. Understand niches, population growth, and competition.
2. Understand disturbance, succession, global climates, and major biogeochemical cycles and describe their roles in determining species distributions, biomes, and species richness.
3. Understand fitness, selection, and genetic drift in evolution.
4. Describe processes of species formation and use data to determine phylogenetic relationships among species.
5. Calculate and apply descriptive and inferential statistics.

Assessment tools and grading:
Quizzes (ca. 7–8) and exams (5); laboratory reports; class participation

Grades will be assigned based on the lecture (50 %) and laboratory (50 %). If you know that you will miss an exam, contact the instructor as soon as possible so that you can take the exam in advance. Make-up exams will be allowed only for *documented excused* absences (e.g., death in the family, extreme sickness).

The final grade will be calculated as follows:	
Lecture, based on:	
3 equally weighted exams (Exam 1, Exam 2, and Final exam)	30 %
Quizzes	10 %
Class participation (in lecture; including presentations)	10 %
Laboratory, based on:	
Laboratory exercises and reports	25 %
Laboratory exams	20 %
Class participation (in laboratory)	5 %

Grammar, spelling, and composition: Because scientists must be able to express themselves in written prose, students must use proper spelling, grammar (including punctuation), and composition. Minor errors in spelling and grammar will be marked 10% off, major grammatical errors will lead to a reduction of 30%, and unintelligible sentences will be given no credit. Illegible answers will be given no credit. Paragraphs must be composed of organized, coherent thoughts and include a lead sentence (proper composition). The instructors are available during office hours or by appointment to answer questions regarding grammar and composition.

Lecture: There will be 2 examinations during the semester plus a comprehensive final exam. Each exam will test material covered in lecture, the textbook, and handouts. Lecture will often begin with a quiz, generally on the reading for that week's topic. The lowest quiz will be dropped. Lecture will also include group discussions and presentations by students.

Laboratory: Each student will be required to hand in 9 short exercises (lab reports). The lowest report will be dropped. Reports are due promptly at the *beginning* of the next lab (a 10 minute grace period will be given). Late reports turned in during the first hour of lab will have a grade reduction of 10 %. Any report turned in after the first hour of lab will receive an automatic zero. All lab reports must be typed. No reports will be accepted by e-mail. Students who miss lab due to an unexcused absence will receive an automatic zero for that lab report. While some laboratory data will be collected by team efforts, each student is required to write and submit his or her own reports. There are also 3 field trips, 1 of which is a self-guided tour of selected exhibits at the American Museum of Natural History. The other 2 are to Inwood Hill Park and to Van Cortlandt Park with the laboratory instructor; because we cannot go on outdoor fieldtrips in the dark, field trips for the evening laboratory section will be during the day on Saturday in lieu of the regular lab period. Before each lab, students should read the particular pages of the lab manual assigned for that week.

Academic Integrity: Plagiarism will dealt with subject to CCNY/CUNY policies regarding academic integrity. The full CUNY policy can be found in the CCNY Undergraduate Bulletin 2007–2009 (Appendix B.3) and on the CCNY website. Cases where academic integrity is compromised will be prosecuted according to these rules. Disciplinary sanctions range from failing the class to expulsion from the College.

Attendance Policy: Lectures and laboratories begin promptly, and you are required to be on time. Attendance in the laboratory, including field trips, is required. Absence from more than 2 lectures or 2 laboratory periods (including field trips) can result in your being dropped from the course for excessive absences (WU).

Support Facilities: The Departmental Resource Center is in Room MR-502, and the Computer Facility is in Room MR-819.

Lecture schedule:

Date	**Topic**	**Readings (Krohne)**
Wed. 30 Jan.	Levels of organization, niche	pp. 6–10, 14–15, 221–222
Wed. 6 Feb.	Population growth and intraspecific competition: geometric, exponential, and logistic growth	pp. 100–103, 182–185
Wed. 13 Feb.	Species interactions, interspecific competition, predation	pp. 222–223, 234–237, 244–245, 262–268
Wed. 20 Feb.	Community structure, disturbance, succession	pp. 272–279, 287–292, 324–335, 369–372
Wed. 27 Feb.	**EXAM 1**	
Wed. 5 Mar.	Global climate, biomes, biogeochemical cycles	pp. 384–391, 404–419
Wed. 12 Mar.	Species richness and diversity, island biogeography	pp. 296–310
Wed. 19 Mar.	Hardy-Weinberg equilibrium	pp. 18–21
Wed. 2 Apr.	Fitness, selection, genetic drift	pp. 21–28, handouts (F 225–233)
Wed. 9 Apr.	History of evolution	handouts (F 1–11)
Wed. 16 Apr.	**EXAM 2**	
Wed. 30 Apr.	Homology, phylogeny, classification	handouts (F 17–27)
Wed. 7 May	Speciation, macroevolution	handouts (F 83–86, 353–356, 379–381, 392–394)
Wed. 14 May	Comparative biology, historical biogeography	handouts (F 123–128, 429–433)
Finals “week” (16–24 May)	**FINAL EXAM,** *date to be announced*	

Laboratory schedule:

Date (Section 1GW)	**Date (Section 3EG)**	**Topic**	**Pages in lab manual**
Mon. 28 Jan.	Wed. 30 Jan.	1. Introduction to research in ecology and evolution	none
Mon. 4 Feb.	Wed. 6 Feb.	2. Community analysis (map, sampling)	4–13
Mon. 11 Feb.	Wed. 13 Feb.	3. Population growth Computer exercise 1 (introduction to Excel) Computer exercise 2 (Populus: exponential/logistic growth)	 14–18 72–73
Mon. 25 Feb.	Wed. 20 Feb.	4. Descriptive statistics Computer exercise 3 (sampling, confidence intervals)	67–68 68–69
Mon. 3 Mar.	Wed. 27 Feb.	5. Inferential statistics (*t*-test)	26–28, 70–71
Sat. 8 Mar.	Wed. 5 Mar.	6. Field trip to Inwood Hill Park (*on Saturday for Section 1GW; no lab on Mon. 10 Mar.*)	31–37
Mon. 17 Mar.	Wed. 12 Mar.	**LAB EXAM 1**	
Wed. 26 Mar.	Wed. 19 Mar.	7. Species distributions Computer exercise 4 (DIVA, modeling distributions)	none
Mon. 31 Mar.	Wed. 2 Apr.	8. Allometry and regression analysis (bones)	78–79
Mon. 7 Apr.	Wed. 9 Apr.	9. Population genetics Computer exercise 5 (selection and drift)	51, 55–56 56
Mon. 14 Apr. (no class)	Wed. 16 Apr. (no class)	10. AMNH field trip *(go on your own sometime this week; no laboratory on Mon. 14 Apr. or Wed. 16 Apr.)*	none
Sat. 3 May	Wed. 30 Apr.	11. Field trip to Van Cortlandt Park (*on Saturday for Section 1GW; no lab on Mon. 28 Apr.*)	31–34, 38
Mon. 5 May	Wed. 7 May	12. Systematics	60–66
Mon. 12 May	Wed. 14 May	**LAB FINAL EXAM**	

Instructor (person who prepared this description): Assistant Professor Robert P. Anderson, 212-650-8504, anderson@sci.ccny.cuny.edu

Date Modified: 14 January 2008