Biology 314: Ecology and Population Biology

Instructor:

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Welcome to Biology 314 (Ecology and Population Biology). In broad terms, population biology is the study of ecological and evolutionary change in groups of organisms, and the primary goal of this course will be to introduce you to the conceptual and theoretical underpinnings of this exciting field. An additional goal of this course will be to familiarize you with the applied importance of population biology – ranging from issues such as the evolution of antibiotic resistance in bacteria to current debates over the role of hatcheries in conserving shrinking populations of Pacific Salmon. These theoretical underpinnings and applied issues will be presented during lectures, reinforced in laboratories, and further emphasized through exams that focus on critical thinking and problem solving.

Course lecture periods will be used to present material in a lecture format, but will also offer opportunities to ask questions and work through problems likely to appear on exams. All lectures will be posted on the web prior to the scheduled class period. Laboratories in this course will use computer simulations and mathematics to help reinforce topics covered in lecture, and to develop certain topics in significantly greater detail. There will be no laboratory examinations or quizzes, but there will be written assignments to be completed after each lab and a report to be written based on articles drawn from the primary literature. Material from lab assignments will **routinely appear on lecture exams**. Laboratory assignments will be intensely mathematical and computational, and for this reason, working in groups to answer and better understand these questions is encouraged. Simply copying other people's work is not acceptable and certainly will not help you to answer the questions appearing on lecture exams.

There will be five 1-hour exams given during the semester. Of these five, your best four will count toward your grade. All previously covered material is fair game on each exam, so **each exam is cumulative**. Potential exam questions will be handed out approximately 1 week before each exam and actual exam questions will be very similar to these. Thus, there will be no surprises on the exams. In addition, laboratory sections immediately preceding exams will be used as review sessions for the material to appear on the exam. This will be your opportunity to ask questions. Coming prepared with questions is critical to the success of these review sessions, as your TA will not prepare a review lecture. Since one of the five exams can be dropped, a make-up exam will be given only for legitimate and **officially documented** university approved reasons. If you feel an error has

been made in the grading of your exam, you must bring this to the attention of your TA or instructor within 5 working days; **no re-grades will be performed after this time**.

Your grade will be determined based upon the following point distribution:

Best four out of five 1 Hour Exams	800
Lab write ups	135
Primary literature report	65
Total	**1,000**

90% of the total points or higher will be an A, 80% of the total points or higher will be a B, 70% of the total points or higher will be a C, etc. The course is not curved, these cut-offs will be strictly applied, and final grades will not be rounded up (or down). In other words, an 89.9% is still a B, not an A.

Learning outcomes:

The primary goal of this course will be to introduce you to the conceptual and theoretical underpinnings of population biology. An additional goal of this course will be to familiarize you with the applied importance of population biology – ranging from issues such as the evolution of antibiotic resistance in bacteria to current debates over the role of hatcheries in conserving shrinking populations of Pacific Salmon.

Lecture and Exam Schedule

Date	**Lecture**
Jan 16	What is population biology?
Jan 21	Properties of populations (GUEST LECTURE)
Jan 23	Malthus, Darwin, and natural selection (GUEST LECTURE)
Jan 28	Genetic variation
Jan 30	Natural selection
Feb 4	Genetic drift (GUEST LECTURE)
Feb 6	**EXAM 1**
Feb 11	Gene flow
Feb 13	Speciation
Feb 18	Population growth I
Feb 20	Population growth II
Feb 25	Life histories I
Feb 27	Life histories II
March 4	Niches and geographic range
March 6	**EXAM 2**
March 11	Interspecific competition
March 13	Concepts of predation
March 18	**Spring Break**
March 20	**Spring Break**
March 25	Herbivory and predation
March 27	Parasitism
April 1	Evolution of infectious disease
April 3	Mutualism
April 8	Coevolution
April 10	**EXAM 3**
April 15	Island Biogeography
April 17	Metapopulations
April 22	Communities
April 24	Food Webs

April 29	Applied population biology
May 1	**EXAM 4**
May 6	**Review (Exam return, grade check)**
May 8	**No class**
May 16	**EXAM 5 (10:00-12:00)**

Schedule for the Monday labs

Date	**Lab**
Jan 20	******No Lab, MLK day******
Jan 27	Population growth
Feb 3	Natural selection/ **Review for Exam 1**
Feb 10	Genetic drift
Feb 17	******No Lab, President's day******
Feb 24	Gene flow and selection
March 3	**Review for Exam 2**
March 10	Density dependence
March 17	**Spring Break**
March 24	Competition
March 31	Predation
April 7	**Review for Exam 3**
April 14	Parasitism
April 21	Predator mediated coexistence
April 28	**Review for Exam 4**
May 5	******No Lab******

Schedule for the Wednesday lab

Date	**Lab**
Jan 22	******No Lab******
Jan 29	Population Growth
Feb 5	Natural selection /**Review for Exam 1**
Feb 12	Genetic drift
Feb 19	******No Lab******
Feb 26	Gene flow and selection
March 5	**Review for Exam 2**
March 12	Density dependence
March 19	**Spring Break**
March 26	Competition
April 2	Predation
April 9	**Review for Exam 3**
April 16	Parasitism
April 23	Predator mediated coexistence
April 30	**Review for Exam 4**
May 7	******No Lab******