

Population Genetics Animal Sciences 446 / IB 416 Fall 2013

Instructor: Dr. Alfred L. Roca, E-mail: roca@illinois.edu
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Course Description: Conceptual and mathematical approach to the genetics of populations: estimation of allele and genotype frequencies; Hardy-Weinberg principle; measures of genetic diversity and distance; selection; non-random mating; genetic drift; mutation; neutral theory; migration and population subdivision; linkage and recombination; coalescence and phylogenetic inference. Applications to animals, plants, human health and wildlife conservation. Course materials will be placed on <https://compass2g.illinois.edu/>

Prerequisites: An introductory genetics course (ANSC 221, ANSC 340, or IB 204); one of MATH 220, MATH 221, or MATH 234; or consent of instructor.

Class Schedule: 107 Animal Science Lab, M&W 9:00 – 9:50 AM; F 9:00 - 10:50 AM.
Please arrive on time; please no texting during class. Office hours MWF after lecture; additional hours will be announced.

Required Text: Hedrick, P.W. 2011. Genetics of Populations. Fourth Edition. Sudbury, MA: Jones and Bartlett Publishers. Other population genetics texts are on reserve at the ACES library.

Problem Sets: Problem sets, past exams and assigned book chapter questions must be worked on by students, to assist in studying and prepare for exams. Joint work on these is encouraged.

Grading: There will be three exams during the semester and a final exam. The final exam will be **cumulative**. For students registered for 3 hours the three exams will count 20% each and the final exam 40% of the final grade. For students registered for 4 hours the three exams will count 15% each and the final exam 30% of the final grade. Plus and minus grades are expected to be used in grading. Grades may be curved to the benefit of students (those not messaging during class or regularly arriving late). Instructor reserves the option to institute quizzes for part of grade. Requests for re-grading of exams must be in writing.

Projects for 4-credit option: Students registering for 4 hours are expected to write a report that comprises 25% of the final 4-credit grade. A one paragraph summary or abstract of the proposed project is due no later than October 4. The final written report in the form of a *scientific article with primary references* will be **due November 8**. If revisions are required to the report, these will be due December 6. Two options are available: (1) a computer simulation or modeling project in some area of population genetics with a project report (5-10 pages, 1.5 space); or (2) a written review of the literature regarding the population genetics of a taxon, or particular topic of interest to you in the field (10-15 pages, 1.5 space).

Academic Integrity: "It is the responsibility of the student to refrain from infractions of academic integrity, from conduct that may lead to suspicion of such infractions, and from conduct that aids others in such infractions" Code of Policies and Regulations, Section 33. All students are responsible for knowing the policies regarding academic integrity. Suspected infractions of academic integrity will be addressed as mandated by the Code.

Population Genetics		Animal Sciences 446 / IB 416		Fall 2013	
Day	Date*	Topic**	Hedrick Chapter		
Mon	8/26	no class			
Wed	8/28	Introduction; review	1		
Fri	8/30	Review and Probability			
Mon	9/2	Labor Day—no class			
Wed	9/4	Review and Probability			
Fri	9/6	Hardy-Weinberg principle and allele frequencies	2		
Mon	9/9	Hardy-Weinberg principle and allele frequencies			
Wed	9/11	Bayesian probability			
Fri	9/13	Hardy-Weinberg principle and allele frequencies			
Mon	9/16	Genetic variation, diversity and distance			
Wed	9/18	Genetic variation, diversity and distance			
Fri	9/20	Selection	3		
Mon	9/23	Selection			
Wed	9/25	Review			
Fri	9/27	FIRST EXAM			
Mon	9/30	Selection			
Wed	10/2	Selection			
Fri	10/4	Selection (topic for 4-credit project due)			
Mon	10/7	Selection			
Wed	10/9	Inbreeding	8		
Fri	10/11	Inbreeding			
Mon	10/14	Inbreeding			
Wed	10/16	Genetic drift and effective population size	4		
Fri	10/18	Genetic drift and effective population size			
Mon	10/21	Genetic drift and effective population size			
Wed	10/23	Review			
Fri	10/25	SECOND EXAM			
Mon	10/28	Genetic drift and effective population size			
Wed	10/30	Mutation	5		
Fri	11/1	Mutation			
Mon	11/4	Neutral theory, coalescence and selection	6-I,II,IV		
Wed	11/6	Neutral theory, coalescence and selection			
Fri	11/8	Neutral theory, coalescence and selection, 4-cr project due			
Mon	11/11	Gene flow & population structure	7		
Wed	11/13	Gene flow & population structure			
Fri	11/15	Linkage and recombination	9		
Mon	11/18	Linkage and recombination			
Wed	11/20	Review			
Fri	11/22	THIRD EXAM			
	11/23	Fall break week begins			
Mon	12/2	Molecular genetics/phylogenetics	6-III		
Wed	12/4	Molecular genetics/phylogenetics			
Fri	12/6	Molecular genetics/phylogenetics (Revisions if any to 4-cr project due)			
Mon	12/9	Molecular genetics/phylogenetics			
Wed	12/11	Review for final			
Wed	12/18	FINAL EXAM 8:00-11:00 AM same room as lectures			
*Guest lecturers may be invited for some dates regardless of topic listed					
**Dates are approximate					