

Evolutionary Genetics

Daniel R. Matute, Ph.D.

BIOL 454-001

MWF: 9:05am-9:55am. GSB1374

Office hours: Wednesday 10:05-11:00am. GSB 3161

Text (optional): Gillespie, J. H. Population genetics: a concise guide. JHU Press. 2010

Additional texts: Hartl, Daniel L., Andrew G. Clark, and Andrew G. Clark. Principles of population genetics. Sinauer associates. Fourth Edition. 2004

Coyne, Jerry A. Why evolution is true. Penguin, 2009.

Nielsen, Rasmus, and Montgomery Slatkin. *An introduction to population genetics: theory and applications*. Sinauer Associates, 2013.

Wakeley, John. Coalescent theory: an introduction. Vol. 1. Roberts & Company Publishers, 2009.

Note: None of these books are mandatory.

Course Goals: The aim of the course is to provide an overview of the evolutionary processes that originate and shape genetic variation. The course will have a heavy quantitative emphasis and **you will be challenged to understand derivations, experiments, and conclusions.**

Attendance Policy: Attendance is not mandatory. However, there will 17 unannounced quizzes (see below) during the semester.

SYLLABUS

1	AUGUST 21	INTRODUCTION
1	AUGUST 23	Phenotypic and genetic variation
2	AUGUST 26-30	FUNDAMENTALS Basic probability
3	SEPTEMBER 4-6	GENETIC VARIATION I Hardy-Weinberg Equilibrium and its extensions
4	SEPTEMBER 9-13	GENETIC VARIATION II Linkage Disequilibrium
5	SEPTEMBER 16-20	QUANTITATIVE GENETICS Fisher's fundamental theorem Price equation
6	SEPTEMBER 23-27	RANDOM GENETIC DRIFT Wright-Fisher model Effective Population size
7	SEPTEMBER 30- OCTOBER 4	COALESCENT THEORY I

		Standard coalescent model
8	OCTOBER 7- OCTOBER 11	COALESCENT THEORY II Deviations from the coalescent: testing neutrality
9	OCTOBER 14	REVIEW
9	OCTOBER 16	MIDTERM
9	OCTOBER 18	Break
10	OCTOBER 21-25	NEUTRAL THEORY Molecular clock
11	OCTOBER 28- NOV. 1	Buffer/
12	NOVEMBER 4-8	SELECTION I Haploids Diploids
13	NOVEMBER 11-15	SELECTION II Mutation Selection Balance Other types of selection
14	NOVEMBER 18-22	INBREEDING I Identity by descent Inbreeding coefficients
15	NOVEMBER 25-NOVEMBER 29	Thanksgiving break
16	DECEMBER 2-4	INBREEDING II Wahlund Effect Population Structure
	DECEMBER 7; 8:00am	FINAL EXAM

Grading

Quizzes* 15%
 Midterm exam 20%
 Paper presentation 15%
 Essay 15%
 Problem sets 15%
 Final Exam 20%

*15 short quizzes

All aspects of the UNC Honor Code will be enforced.

GRADES

Quizzes There will be 17 quizzes during the semester. These quizzes will happen at any point in the semester and will be unannounced. The two worst grades will be dropped. There will be no makeup quizzes.

Paper Presentations: Each student will lead the discussion of a weekly paper (posted on sakai). The selection of the weekly presenter will be at random and

students might have to present more than once. If this is the case, the average of the two (or more) grades will be taken into consideration.

Grade Complaints: Re-grade requests are allowed. Such requests must be made in within one week of receiving a grade and they must be made in written form. In these cases, I will regrade the whole quiz/exam.

GRADE SCALE

Letter Grade	Percentage
A	93-100
A-	90.00-92.99
B+	87.00-89.99
B	83.00-86.99
B-	80.00-82.99
C+	77.00-79.99
C	73.00-76.99
C-	70.00-72.99
D+	67.00-69.99
D	63.00-66.99
D-	60.62.99
F	0-59.9999999999

TECHNOLOGY USE

- Use of computers is allowed but only for taking notes. The instructor has the right to end any session if ANY of the students is found using facebook, twitter, youtube or any other social media. In such a case, the instructor will assume that the topics to be covered that day were discussed.
- Recording and distributions of lectures is prohibited. Use of cell phones and similar devices is prohibited.