

MWF 11:30-12:20 am, S110 Foege
Instructor: Dr. Mary Kuhner
Office: S332C Foege (call on the lobby phone if you don't have a building pass)
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Course structure:

Genome 562 covers the concepts and mathematics of the behavior of genes in populations, including natural selection, genetic drift, population structure, genetic recombination and linkage. It also covers major inference methods, including phylogenetics, the coalescent, and quantitative genetics.

Due to lack of time, it does not cover the speciation process or evolutionary trends beyond the species level.

The course assumes knowledge of fundamental genetics: meiosis, inheritance, recombination and linkage, and the structure of genes and chromosomes. The homework will involve small amounts of programming, so knowledge of a programming language is helpful, but I am willing to coach the needed skills outside of class if necessary.

Grading:

Grades will be based 1/3 on weekly homework (*originally 8 assignments total, adjusted to 7 due to snow days*), and 1/3 each on the midterm and final exams. You may work together on the homework, but be sure that every member of the team knows how to solve all of the problems.

Like genetics in general, population genetics is a problem-solving domain, not a memorization domain. The shorter homework problems are a model for what the exams will be like.

All homework will be posted on the course web site. It can be turned in on paper or electronically, but please do **not** send me cell phone photos of paper homework.

Course Schedule

This version is corrected for 2/4, 2/8, 2/11 snow closures.

Fels: Felsenstein *Theoretical Evolutionary Genetics*

Day	Date	Topic	HW	Optional readings
Mon	Jan 7	Wright-Fischer and the coalescent	HW1 assigned	Fels 453-456
Wed	Jan 9	Genetic drift		Fels 246-258
Fri	Jan 11	Population growth and shrinkage		Fels 258-260, 457
Mon	Jan 14	Mutation process	HW1 due, HW2 assigned	Fels 135-141
Wed	Jan 16	Natural selection, Hardy-Weinberg		Fels 5-9, 49-56
Fri	Jan 18	Overdominance and underdominance		Fels 65-66, 80-88
Mon	Jan 21	MLK HOLIDAY	HW2 due, HW3 assigned	Fels 304-337
Wed	Jan 23	Selection versus drift		
Fri	Jan 25	Population diversity		
Mon	Jan 28	Multiple locus selection, epistasis	HW3 due, HW4 assigned	Fels 349-354
Wed	Jan 30	Linkage and recombination		Fels 354-373
Fri	Feb 1	Hitchhiking, surfing, and genetic draft		Fels 377-389
Mon	Feb 4	NO CLASS DUE TO SNOW	HW4 due	Fels 167-203
Wed	Feb 6	Subdivided populations and migration		
Fri	Feb 8	NO CLASS DUE TO SNOW		
Mon	Feb 11	NO CLASS DUE TO SNOW		Fels 207-213, 232-235
Wed	Feb 13	MIDTERM		
Fri	Feb 15	Inbreeding		
Mon	Feb 18	PRESIDENT'S DAY HOLIDAY	HW5 assigned	Fels 393-399, 404-415, 421-428 Fels 430-458
Wed	Feb 20	Quantitative genetics		
Fri	Feb 22	Selection on quantitative traits		
Mon	Feb 25	Sex linkage, sex ratio, sex determination	HW5 due, HW6 assigned	Fels 17-21
Wed	Feb 27	Chromosomal and genomic evolution		
Fri	Mar 1	Concerted evolution, mobile genetic elements		
Mon	Mar 4	Evolutionary trees	HW6 due, HW7 assigned	
Wed	Mar 6	Comparing and validating phylogenies		
Fri	Mar 8	Gene trees versus species trees		
Mon	Mar 11	Coalescent inference	HW7 due	Fels 462-476
Wed	Mar 13	Kin and group selection		Fels 119-125
Fri	Feb 22	Competition among levels of organization		
Wed	Mar 20	2:30-4:20 Final Exam		