

Plant Biology/iBio 849, Evolutionary Biology, Spring 2018
Detailed Syllabus: Basic concepts in microevolution

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Jan 9	Introduction, Brief History	Futuyma 2009 chapter 1
Jan 11	Hardy-Weinberg, Inbreeding	Conner and Hartl ch. 1&2; Problem 2.3
Jan 16	Changes in allele frequencies	Conner and Hartl pp. 47-77; Problems 3.5, 3.7a
Jan 18	Discussion	Hori 1993; Barrett et al. 2008
Jan 23	Population genetics synthesis	Conner and Hartl pp. 77-89
Jan 25	Discussion	Taylor et al. 1995; Eckert et al. 1996
Jan 30	Genetic variance, GxE, Local adaptation	Conner and Hartl 97-150; 163-170 optional Problems 4.3 and 5.1
Feb 1	Discussion	Wiggins 1989; Kruuk et al. 2000
Feb 6	Correlations among traits, Natural selection on phenotypes	Conner and Hartl 150-163; 189-218 Problems 6.3 and 6.4
Feb 8	Discussion	Grafen 1988; Brodie 1992
Feb 13	Response to selection, QTL mapping	Conner and Hartl 170-180; 216-224 Problems 5.4a&b; 6.2
Feb 15	Discussion	Berenbaum et al. 1986; Bradshaw et al. 1995
Feb 20	Evolution and Development	Futuyma 2009 Chapter 21
Feb 22	Discussion	Nijhout and Emlen 1998; Shapiro et al. 2004
Feb 27	Molecular Evolution	Hartl 2000 ch. 3
Mar 1	Discussion	Hafner et al. 1994; Natarajan et al. 2016

Text: Conner, J. K. and D. L. Hartl. 2004. *A Primer of Ecological Genetics*. Sinauer Associates, Sunderland, MA.

Grading: 50% Class assignments

All assignments and readings (except the text) will be on D2L, and all assignments are handed in and handed back using D2L. For each Tuesday class you need to submit one question about something you didn't understand in the readings for that day; these are due by 9PM the night before and are worth 2 points each. I won't answer or hand these back, but you should ask these questions if that topic comes up in class, and I will use some of them for discussion.

On most Thursdays there will be an assignment of one question to answer briefly (one paragraph) for each paper, worth 7 points. While not required, I strongly encourage you to **work on these in pairs**; if you do, both members of the pair hand in the same exact .docx on D2L with both names in the filename.docx. If you are having trouble finding a partner, email me and I will try to play matchmaker. Thursday assignments should be MS Word.docx, **12-point font, 1 inch margins minimum, and one-page total maximum** (you should be able to answer the questions very well with less than one page). **Please be support your points with actual data from the papers (not just what the authors claim), and be very specific about where the data you are citing is coming from in the paper, e.g. what table or figure the data or results were actually in.**

The **problems assigned from the book are not to be handed in** (answers are at Sinauer.com), but should help you understand the material better. In the same vein, the readings questions on D2L are designed to guide your reading, and usually our class discussions will use them, so try to answer them as you read.

The assignment points are all of equal weight, and will be summed for the 50% of your grade from my part of the class. Note that this course is certainly graded on a curve, so any given percentage right or wrong does not translate into a particular grade. We give mostly 3.5 and 4.0 grades in this course; typically the only people that get 3.0 are those that don't hand in assignments or miss class frequently.

- Barrett, R. D. H., S. M. Rogers, and D. Schluter. 2008. Natural selection on a major armor gene in threespine stickleback. *Science* 322:255-257.
- Berenbaum, M. R., A. R. Zangerl, and J. K. Nitao. 1986. Constraints on chemical coevolution: Wild parsnips and the parsnip webworm. *Evolution* 40:1215-1228.
- Bradshaw, H. D., Jr., S. M. Wilbert, K. G. Otto, and D. W. Schemske. 1995. Genetic mapping of floral traits associated with reproductive isolation in monkeyflowers (*Mimulus*). *Nature* 376:762-765.
- Brodie, E. D., III. 1992. Correlational selection for color pattern and antipredator behavior in the garter snake *Thamnophis ordinoides*. *Evolution* 46:1284-1298.
- Eckert, C. G., D. Manicacci, and S. Barrett. 1996. Genetic drift and founder effect in native versus introduced populations of an invading plant, *Lythrum salicaria* (Lythraceae). *Evolution* 50:1512-1519.
- Futuyma, D. J. 2009. *Evolution*. Sinauer, Sunderland, MA.
- Grafen, A. 1988. On the uses of data on lifetime reproductive success. Pp. 454-471 in T. H. Clutton-Brock, ed. *Reproductive Success*. University of Chicago Press, Chicago.
- Hafner, M. S., P. D. Sudman, F. X. Villablanca, T. A. Spradling, J. W. Demastes, and S. A. Nadler. 1994. Disparate rates of molecular evolution in cospeciating hosts and parasites. *Science* 265:1087-1090.
- Hartl, D. L. 2000. *A Primer of Population Genetics*. Sinauer, Sunderland, MA.
- Hori, M. 1993. Frequency-dependent natural selection in the handedness of scale-eating cichlid fish. *Science* 260:216-219.
- Kruuk, L. E. B., T. H. Clutton-Brock, J. Slate, J. M. Pemberton, S. Brotherstone, and F. E. Guinness. 2000. Heritability of fitness in a wild mammal population. *Proc. Natl. Acad. Sci. U. S. A.* 97:698-703.

- Natarajan, C., F. G. Hoffmann, R. E. Weber, A. Fago, C. C. Witt, and J. F. Storz. 2016. Predictable convergence in hemoglobin function has unpredictable molecular underpinnings. *Science* 354:336-339.
- Nijhout, H. F., and D. J. Emlen. 1998. Competition among body parts in the development and evolution of insect morphology. *Proc. Natl. Acad. Sci. U. S. A.* 95:3685-3689.
- Shapiro, M. D., M. E. Marks, C. L. Peichel, B. K. Blackman, K. S. Nereng, B. Jonsson, D. Schluter, and D. M. Kingsley. 2004. Genetic and developmental basis of evolutionary pelvic reduction in threespine sticklebacks. *Nature* 428:717-723.
- Taylor, M. F. J., Y. Shen, and M. E. Kreitman. 1995. A population genetic test of selection at the molecular level. *Science* 270:1497-1499.
- Wiggins, D. A. 1989. Heritability of body size in cross-fostered tree swallow broods. *Evolution* 43:1808-1811.