EXPLORATIONS IN GENOMICS

Advanced Topics in Evolution, Biol 644 (3 credits)
University of Alaska Fairbanks

Instructor: Kevin Winker, Spring 2017: kevin.winker@alaska.edu; University of Alaska Museum, Room 038. 474-7027

Class hours: Monday 1415-1715. Class will meet in 103 Murie.

Office hours: Tuesday 1300-1400.

Prerequisites: Undergraduate courses in evolution and genetics or instructor’s approval.


Course description: This is not a lecture-driven course, but an intensive subject-based seminar. There is no text that I find acceptable for this topic, so we will read a lot of the primary literature. Most (and perhaps all) of it will be material from within the last 2-3 years. Exactly what we read will in part be determined by you; there are large stacks of options, especially if we choose readings in agricultural and medical genomics. We will mostly set techniques aside and focus on increasing our understanding of what occurs genomically during adaptation (and these processes help us understand maladaptations as well, such as human diseases), divergence, and lineage formation. (The tools are important, but they continue to change fast.) We will consider not only the basic science of the genomics of adaptation and divergence, but also the applied aspects of how developments in these areas affect our understanding (and management) of biodiversity and disease. The group project (see below) will be chosen early in the class. Some of the issues we are likely to touch on include: phenomics, ecological speciation (speciation with gene flow), transposable elements, gene regulation, many loci of large effect versus few of small (how is phenotype coded?), candidate loci, neutral and near-neutral theory, chromosomal inversions, genetic architecture, linkage disequilibrium, epistasis, pleiotropy, polyploidy and hybrid speciation, and detecting selection.

Course requirements:
- Attend class; lead at least one.
- Write a succinct review/summary of the papers you read.
- Participate in writing a collaborative group paper on a question in this area.
- Open book final (may prove to be a manuscript review).

Course purpose and objectives: The overall goal is to increase graduate student knowledge, understanding, and skills dealing with the genomic changes associated with adaptation, divergence, and lineage formation. Upon completion of the course students will have a working familiarity both with the genomic literature and how it relates to their specific field(s) and research.

Ancillary information: Prerequisites BIOL 481 or instructor’s permission.
Student Support Services: 6844 (508 GR); Disability Services: 7043 (203 WHIT); Student Code of Conduct: www.uaf.edu/schedule/conduct/#condu.