

"PRINCIPLES OF PHYLOGENETICS: ECOLOGY AND EVOLUTION"

*Integrative Biology 200B*  
University of California, Berkeley

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Unresolved areas in comparative methods and the study of adaptation, biogeography and ecology:

- Branch lengths
  - Speciation, biogeography, rate of trait evolution: Real and relative time
  - Independent contrasts: BL are in units of 'expected change'
  - would a phenotypic basis be better?
- Models of evolution
  - Will we obtain robust results on brownian vs. OU vs. other models for the evolution of continuous traits? Is this a fruitful path to advancing our understanding?
- Taxon sampling: evaluating whether methods are robust to taxon sampling, and whether the particular sample in a given study is appropriate
  - Which clade to sample, vs. which taxa to sample within a clade
- Community ecology <-> Biogeography: Identifying the the transition from local assembly to speciation/extinction processes
- Reticulate evolution - The network to bifurcating transition (and back)  
gene trees vs. species trees
- Comparative methods and species concepts – is the method robust to species definitions, and would it work if the tips were semaphoronts?
- Tree-thinking and education: what should every freshman know?