**Major Themes:**

1. Natural Processes that affect adaptation
2. Experimental Techniques to study adaptation
3. Intersection of these two arenas

**Natural processes that affect adaptation**

**Physical Environment** (weeks 1, 3, 5)

* Oceanographic features
  + Upwelling, currents, abiotic features
* Physical barriers

**Variability** (Week 1, 8)

* Predictable vs. stochastic variation
* Spatial and temporal scale of variability

**Natural History** (Week 5, 6)

* Reproductive Strategy
  + Timing, fecundity, method (sexual vs. asexual, spawning strategy)
* Life history strategy (simple vs. complex)
* Natural range and dispersal
* Individual sensitivity to stressors

**Phenotypic Plasticity** (Weeks 1, 2, 3, 7, 9)

* Under selection (genetic assimilation or Baldwin’s effect
* Buffer against selection or add to genetic load

**Genetic Architecture** (Weeks 4, 9)

* Prevalence of inversions/deletions in nature unknown
* Alleles of small effect common but underappreciated
* Epigenetics (may also affect apparent plasticity)

**Genetic Drift** (Weeks 2, 3, 7, 8)

* Genetic drift and mutation rates
* Migration/genetic load
* Interacts with selection
* Affects genetic variation

**Natural Selection** (Weeks 3, 4, 5, 6, 8, 9)

* Strength of selection
* Source of selection (abiotic vs. biotic)
* Nature of selection (balancing, directional, etc.)

**Dispersal** (Weeks 1, 2, 3, 5, 6, 7)

* Symmetric vs. Asymmetric dispersal
* Phenotype environment mismatches
  + Sweepstakes reproduction
* Tightly tied with gene flow and natural history
* Ability to disperse (sessile vs. mobile)(mobile throughout life cycle?)

**Gene Flow** (Weeks 1, 2, 3, 4, 5, 7)

* Immigration/Emigration rates
  + Realized vs. possible gene flow
* Dispersal dynamics
  + Range of dispersal, frequency

**Population** (Weeks 2, 3, 5, 6, 9)

* Define population?
* Effective size and structure of populations
* Location of population (edge vs. center)
* Discrete vs. continuous populations (depends on gene flow)
* Genetic variation within population

**Practical issues in the study of adaptation**

**Physical Scale** (Week 1, 3, 4, 6, 7)

* Relevant spatial/temporal scale

**Resources** (Weeks 2, 3)

* What is feasible
* What is affordable under limited time and financial budget

**Experimental Design** (Weeks 2, 3, 8)

* Common garden or reciprocal transplant
* Are populations continuous?

**Biological Level** (Weeks 1, 2, 3, 8)

* Which level is best (gene to phenotype)
* Are measures of fitness appropriate

**Detection Limits** (Weeks 4, 8)

* What is best statistical approach
* Are molecular tools advanced to detect variables of interest
  + Alleles of small effect, inversions, etc.