Level 1 — Natural Selection

- Natural selection
- Evolution
- Gene Pool / Genes
- Hardy-Weinberg Equilibrium
- Fitness
- Adaptation
- Darwin
- Mutation

Level 2 — Examples of Natural Selection

- Natural Selection
- Flowering / Climate
- Phenotype
- Genotype
- Sickle-Cell Anemia
- Antibiotic resistance in bacteria

Level 3 — Genetic Drift

- Evolution
- Genetic drift
- Bottleneck
  - N. Elephant Seal
- Founder effect
  - Finches, tortoises
- Gene Flow
- Microevolution

Level 4 — Evidence of Evolution

- Biogeography
- Fossils
- Anatomy
  - Homology
  - Analogy
  - Embryology
  - Vestigial
- Molecular Evidence
- Evolutionary tree

Level 5 — Essential Characteristics are Conserved

- Life
- Genetic code
- Metabolism
- Central dogma
- Genes
- Eukaryotic cells
  - Eukarya
- Prokaryotic cells
  - Bacteria
  - Archaea

Phylogeny 006

- Convergent evolution
- Analogy vs. Homology
- Systematics
- Taxon –
- Cladogram
  - Clade
- Parsimony
- rRNA vs. mt DNA
- Monophyletic

007 Speciation and Extinction

- Speciation
  - Adaptive Radiation
- Extinction
  - Mass Extinction
    - Permian
    - Cretaceous (K/T Boundary)
- Niche

008 – Speciation

- Speciation
- Species = Biological / Morphological / Phylogenetic / Ecological
- Pre-Zygotic Barriers
  - Temporal
  - Habitat
  - Behavior
  - Mechanical
  - Gametic
- Post-Zygotic Barriers
- Allopatric vs. Sympatric Speciation

009 - Populations Continue to Evolve

Natural Selection
- Directional
- Stabilizing
- Disruptive

Sexual Selection
- Intersexual vs. Intrasexual
- Sexual Dimorphism

Hybrid Zones

Galapagos Finches

010 - Abiogenesis

Stromatolite

Miller-Urey Experiment

LUCA

Monomers - Protocell (protobiont)

Ribozymes

011 The Origin of Life

LUCA

Prokaryotic cells → Archaea, Bacteria

Eukaryotic cells

Multicellular life

Horizontal Gene Transfer

DNA

012 Free Energy

Energy

1st Law of Thermodynamics

2nd Law of Thermodynamics

Gibbs Free Energy

Exergonic Reaction
- Cellular Respiration

Endergonic Reaction
- Photosynthesis

ATP

Energy Coupling