

Lecture Topics	Required Reading & Videos
Start Module 1: Biodiversity	
Phylogenetic Trees Recognizing relationships between life on Earth	Phylogenetic trees
Prokaryotes: Bacteria and Archaea Earliest signs of life Prokaryotes as ancient architects Roles in medicine & bioremediation	Prokaryotes: bacteria and archaea
Protista Origins of the Eukaryotes Diversity in life cycles, morphology, and metabolism	Protista
Fungi Ascomycetes & Basidiomycetes Ecosystem services	Fungi
Plants Seedless and seed plants Origins and ecological importance	Plants
Animal Diversity Origins of major animal groups	Animal diversity
Animals: Invertebrates Annelids, cephalopods, and insects	Animals: invertebrates
Animals: Vertebrates Fish, reptiles, birds, and mammals	Animals: vertebrates
Mass Extinctions & Climate Variability Causes and evidence for mass extinctions Climate variability	Mass extinctions and climate variability
Start Module 2: Growth and Reproduction	
Multicellularity, Development, and Reproduction Differentiation and growth	Multicellularity, Development, and Reproduction
Animal Reproduction I Mating systems and reproductive strategies	Animal reproductive strategies
Animal Reproduction II Reproductive structures and functions	Animal reproductive structures and functions
Animal Development I Fertilization, polarity, cleavage	Animal development I: fertilization and cleavage
Animal Development II Gastrulation, differentiation, amniotic membranes	Animal development II: gastrulation and organogenesis
Plant Reproduction Double fertilization, seeds, fruit Alternation of generations	Plant reproduction
Plant Development I Tissue development, differentiation, and function	Plant development I: Tissue differentiation and structure
Plant Development II Role of meristems Primary and secondary growth	Plant development II: Primary and secondary growth
Start Module 3: Chemical and Electrical Signals	

Class Topic	Assigned Reading
Principles of chemical signaling, and communication by microbes Quorum sensing, biofilm formation in microbes	Principles of chemical signaling, and communication by microbes
Plant Hormones and Sensory Systems Growth, dormancy, germination Responses to injury, chemical defenses	Plant hormones and sensory systems
Animal Hormones Hormone effects, production, distribution Case study systems	Animal hormones
Neurons Ion channels, action potentials, synapses, neurotransmitters	Neurons
Nervous Systems Integration, learning & memory	Nervous systems
Animal Sensory Systems Sensory cells & organs, specificity Case study systems: mechanoreceptors and nociceptors	Animal sensory systems
Motor proteins and muscles Cilia, flagella, muscles	Motor proteins and muscles
Motor units and skeletal systems Control of contraction strength Types of skeletal systems	Motor units and skeletal systems
Start Module 4: Nutrition, Transport, and Homeostasis	
Nutritional Needs & Adaptations Autotrophy, heterotrophy, mixotrophy	Nutrition: what plants and animals need to survive
Acquisition of Nutrients in Animals Structure and function of digestive organs Microbial roles in nutrition	Nutrient acquisition by animals
Animal Gas Exchange and Transport Principles of diffusion Lungs and gills Mechanisms for transporting O ₂ and CO ₂	Animal gas exchange and transport
Acquisition of Nutrients in Plants Soil processes, N ₂ -fixation	Nutrient acquisition by plants
Plant Transport Processes I Uptake of water and minerals Xylem and evapotranspiration	Water transport in plants: xylem
Plant Transport Processes II Phloem, sieve tubes, and translocation	Sugar transport in plants: phloem
Animal Circulatory Systems Evolution of circulatory systems, heart structure, blood vessel structure and function	Animal circulatory systems
Mammalian Cardiac Cycle Human cardiac cycle, hormonal regulation	Mammalian cardiac cycle

Animal Ion and Water Regulation Excretory mechanisms and systems Adaptations in different environments	Animal ion and water regulation
Mammalian Kidney Mammalian kidney function and hormonal regulation	Mammalian kidney
Plant and Animal Environmental Responses Photosynthetic strategies & water conservation Thermoregulation	Plant and animal responses to the environment
