

**BIOLOGY 221
ECOLOGY AND EVOLUTION
SPRING 2016**

DATES	THEMES & Topics	READINGS
<i>ECOLOGY - THE STUDY OF THE RELATIONSHIP BETWEEN ORGANISMS AND THEIR ENVIRONMENT</i>		Chap. 1
Jan. 11, 13	What is ecology? Levels of ecological organization The process of ecological investigation Case Study: amphibian decline & UV-B Major ecological lessons	Article 1 Articles 2-3
<i>ECOSYSTEMS HAVE MANY SHAPES AND SIZES</i>		
Jan. 15	What is an ecosystem?	
<i>ENVIRONMENTAL CONDITIONS AFFECT ALL LIVING THINGS</i>		
	Earth as an Ecosystem The physical & chemical environment of Earth	
Jan. 20, 22	Energy The planetary energy budget Atmospheric circulation	Chap. 2
Jan. 25, 27	Ocean structure & circulation The effects of atmospheric & oceanic circulation	
	<i>Applications:</i> Human alteration of the global environment	
Jan. 29, Feb. 1	Rising CO ₂ & its ecological effects	Article 4 Chap. 6 (pgs. 117-120) Chap. 27
Feb. 3	Global climate change & its ecological effects	Articles 5-6
Feb. 5	Global climate change & its ecological effects (cont.)	
<i>SIMILAR ENVIRONMENTS CAN SUPPORT SIMILAR ECOSYSTEMS</i>		
Feb. 8	Biomes Controlling factors Tundra, boreal forests, & temperate forests	Chap. 23 (sections 1-2, 5, 7-9) Chap. 4 (sections 3-5, 7, 10) Article 7
Feb. 10	Tropical forests	
Feb. 12	Deserts	
Feb. 15	The ocean	Chap. 3 (sections 2-4) Chap. 25 (sections 1-3) Chap. 24 (sections 9-13)
	<i>Applications:</i> Estimating global plant productivity	
<i>NATURAL SYSTEMS RECYCLE ESSENTIAL NUTRIENTS</i>		Chap. 22 (sections 1 & 4)
Feb. 17	Global Biogeochemical Cycles The hydrologic & carbon cycles	Chap. 3 (section 1) Chap. 22 (sections 6-7, 23); Fig. 22.13
Feb. 19, 22, 24	The nitrogen & phosphorus cycle	Chap. 22 (sections 8-9) Chap. 15 (section 11) Article 8; p. 505-507
	<i>Applications:</i> overfertilization of land & water	
<i>NATURAL SYSTEMS ARE MAINTAINED AND CONSTRAINED BY PROCESSING ENERGY</i>		
Feb. 26	Energy flow & Productivity	Chap. 20 (sections 1-4, 8, 10, & 13)
	<i>Applications:</i> Biological magnification of toxins	

	<i>INTERACTING POPULATIONS FORM ECOLOGICAL COMMUNITIES</i>	Chap. 27 (sections 1-5)
Feb. 29	Types and patterns of species diversity Island biogeography	Article 9 Chap. 19 (section 6)
	<i>COMMUNITIES RECOVER FROM DISTURBANCE BUT NOT ALWAYS</i>	Chap. 18 (sections 1-3)
Mar. 2	Primary & Secondary Succession Communities can exist in several stable configurations <i>Applications:</i> Climates change, communities change	
	<i>POPULATIONS ARE INDIVIDUALS OF A SPECIES LIVING IN THE SAME PLACE AT THE SAME TIME</i>	
Mar. 4	Populations defined Population structure Density, distribution and dispersion <i>Applications:</i> Finding rare species	Chap. 8
	<i>ALL POPULATIONS CAN GROW EXPONENTIALLY</i>	
Mar. 7	Simple exponential growth	Chap. 9
Mar. 9, 11	Demography Exponential growth and stage structure Fitness <i>Applications:</i> Human population growth	
	<i>NO POPULATION GROWS WITHOUT LIMITS</i>	
Mar. 14, 16	Density-Dependence (within species)	Chap. 11
Mar. 18, 28	Competition (between species) <i>Applications:</i> Evolution of life histories and niches	p. 244, Chap. 13
Mar. 30	Predator-prey dynamics	Chap. 14
Apr. 1	<i>Applications:</i> Volterra Principle	
Apr. 4	Herbivory, Parasitism, Mutualism <i>Applications:</i> The value of mutualisms	Chap. 15
	<i>THE EVOLUTIONARY PLAY OCCURS IN AN ECOLOGICAL THEATER</i>	
Apr. 6	The 'Null Model of Evolution: The Hardy-Weinberg Law	Chap. 5
Apr. 8	Mutation	
Apr. 11	Drift	
Apr. 13	Natural selection: Model of allele frequency change	Readings to be assigned
Apr. 15	Selection in the 'real' world on 'real' traits	
Apr. 18	'Higher' level variation and Speciation	
	<i>NOTHING IN BIOLOGY MAKES SENSE EXCEPT IN THE LIGHT OF EVOLUTION</i>	
Apr. 20	The evolution of sex and sexual selection	
Apr. 22	The evolution of behavior <i>Applications:</i> Memes; the cultural equivalent of genes	
	<i>TO KEEP EVERY COG AND WHEEL IS THE FIRST PRECAUTION OF INTELLIGENT TINKERING</i>	
Apr. 25	The growing science of conservation biology The value of biological diversity	Readings to be assigned
Apr. 27	Extinction: Causes & Prevention	
Apr. 29	Emerging concepts in conservation biology	

Topics in bold will be covered mostly by material contained in the textbook.