

**BIOLOGY 221**  
**ECOLOGY AND EVOLUTION**  
**SPRING 2010**

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	Articles 1-4
<i>ECOSYSTEMS HAVE MANY SHAPES AND SIZES</i>		
	What is an ecosystem? Approaches to investigating ecosystems	
<i>ENVIRONMENTAL CONDITIONS AFFECT ALL LIVING THINGS</i>		
	Earth as an Ecosystem The physical & chemical environment of Earth Energy	Chap. 2
Jan. 15, 20	The planetary energy budget Atmospheric circulation	
Jan. 22, 25	Ocean structure & circulation The effects of atmospheric & oceanic circulation	
Jan. 27, 29	<i>Applications:</i> Human alteration of the global environment Rising CO <sub>2</sub>  Global climate change	Article 5 Chap. 29 (29.2 & 29.5) Articles 6 & 7 Chap. 29 (sections 1 & 6-12)
Feb. 1, 3	Changing tropospheric chemistry	Article 8
<i>SIMILAR ENVIRONMENTS CAN SUPPORT SIMILAR ECOSYSTEMS</i>		
Feb. 5	Biomes Controlling factors Tundra, <b>boreal forests, &amp; temperate forests</b>	Chap. 23 (sections 1-2, 4-5, 7-9) Chap. 4 (sections 3-10) Article 9
Feb. 8	Tropical forests	
Feb. 10	<b>Grasslands &amp; Deserts</b>	
Feb. 12	The ocean	Chaps. 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>		
Feb. 15	Global Biogeochemical Cycles The <b>hydrologic</b> & carbon cycles	Chap. 22 (sections 1-10 & Fig. 13)  Chap. 3 (section 1) Chap. 29 (sections 3-4)
Feb. 17, 19, 22	The nitrogen & <b>phosphorus</b> cycle	Chap. 15 (section 11)
	<i>Applications:</i> overfertilization of land & water	Article 10
<i>NATURAL SYSTEMS ARE MAINTAINED AND CONSTRAINED BY PROCESSING ENERGY</i>		
Feb. 24, 26	Energy flow, trophic levels & trophic structure Productivity <i>Applications:</i> Biological magnification of toxins	Chap. 20 (sections 1-4, 7, 9, & 12)  Article 11

	<i>INTERACTING POPULATIONS FORM ECOLOGICAL COMMUNITIES</i>	Chap. 26 (sections 1-5)
Mar. 1	Types and patterns of species diversity Island biogeography	Article 12 Chap. 19 (section 4)
	<i>COMMUNITIES RECOVER FROM DISTURBANCE BUT NOT ALWAYS</i>	Chap. 18 (sections 1-3)
Mar. 3	Primary & Secondary Succession Communities can exist in several stable configurations <i>Applications:</i> Climates change, communities change	Article 12
	<i>POPULATIONS ARE INDIVIDUALS OF A SPECIES LIVING IN THE SAME PLACE AT THE SAME TIME</i>	
Mar. 5	Populations defined Population structure Density, distribution and dispersion <i>Applications:</i> Finding rare species	Chap. 9
	<i>ALL POPULATIONS CAN GROW EXPONENTIALLY</i>	
Mar. 8	Simple exponential growth	Chap. 10
Mar. 10	Exponential growth and age structure Exponential growth and stage structure Sensitivity analysis <i>Applications:</i> Human population growth	Article 13
	<i>NO POPULATION GROWS WITHOUT LIMITS</i>	
Mar. 12, 15	Density-Dependence (within species)	Chap. 11
Mar. 17	Competition (between species)	Chap. 13
Mar. 19	<i>Applications:</i> Evolution of life histories and niches	
Mar. 22	Predator-prey dynamics	Chap. 14
Mar. 24	<i>Applications:</i> Volterra Principle	
Mar. 26	Herbivory Parasitism Mutualism <i>Applications:</i> The value of mutualisms	Chap. 15
	<i>THE EVOLUTIONARY PLAY OCCURS IN AN ECOLOGICAL THEATER</i>	
Apr. 5	The process of evolution The Hardy-Weinberg Law	Chap. 5
Apr. 7, 9	Mutation	
Apr. 12	Drift Natural selection	Readings to be assigned
Apr. 14, 16	Model of allele frequency change	
Apr. 19	Selection in the 'real' world on 'real' traits	
Apr. 21	Speciation	
	<i>NOTHING IN BIOLOGY MAKES SENSE EXCEPT IN THE LIGHT OF EVOLUTION</i>	
Apr. 23	The evolution of sex and sexual selection 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. 26	The growing science of conservation biology The value of biological diversity	Chap. 28
Apr. 28	Extinction: Causes & Prevention	
Apr. 30	Emerging concepts in conservation biology	

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**Topics in bold will be covered mostly by material contained in the textbook & video overviews.**