### DATES  |  THEMES & Topics  |  READINGS
---|---|---

**ECOLOGY - THE STUDY OF THE RELATIONSHIP BETWEEN ORGANISMS AND THEIR ENVIRONMENT**

Jan. 14, 16  |  What is ecology?  
Levels of ecological organization  
The process of ecological investigation  
Case Study: amphibian decline & UV-B  
Major ecological lessons  |  Chap. 1  

**ECOSYSTEMS HAVE MANY SHAPES AND SIZES**

What is an ecosystem?  
Approaches to investigating ecosystems  |  Articles 1-3  

**ENVIRONMENTAL CONDITIONS AFFECT ALL LIVING THINGS**

Earth as an Ecosystem  
The physical & chemical environment of Earth  
**Energy**  |  Chap. 2  

Jan. 18, 23  |  The planetary energy budget  
Atmospheric circulation  
Ocean structure & circulation  |  Article 4  

Jan. 25, 28  |  The effects of atmospheric & oceanic circulation  |  Chap. 30 (sections 2 & 5)  

**SIMILAR ENVIRONMENTS CAN SUPPORT SIMILAR ECOSYSTEMS**

Feb. 8  |  Biomes  
Controlling factors  
Tundra, **boreal forests**, & **temperate forests**  |  Chap. 24 (sections 1-2, 4-5, 7-9)  
Chap. 4 (sections 3-9, 10)  
Article 7  

Feb. 11  |  Tropical forests  
Feb. 13  |  **Grasslands** & Deserts  
Feb. 15  |  **The ocean**  |  Chap. 3 (sections 2-4)  
Chap. 26 (sections 1-3)  
Chap. 25 (sections 9-13)  

**APPLICATIONS**: Estimating global plant productivity  

**NATURAL SYSTEMS RECYCLE ESSENTIAL NUTRIENTS**

Feb. 18  |  Global Biogeochemical Cycles  
The **hydrologic** & carbon cycles  |  Chap. 3 (section 1)  
Chap. 30 (sections 3-4) & Fig. 23.13  
Chap. 25 (sections 5-7)  
Chap. 23 (sections 8-9); N saturation  
Article 8  

Feb. 20, 22, 25  |  The nitrogen & **phosphorus** cycle  |  Chap. 21 (sections 1-4, 8, 10, & 13)  

**APPLICATIONS**: overfertilization of land & water  

**NATURAL SYSTEMS ARE MAINTAINED AND CONSTRAINED BY PROCESSING ENERGY**

Feb. 27  |  Energy flow, trophic levels & trophic structure  
Productivity  |  Chap. 21 (sections 1-4, 8, 10, & 13)  

Mar. 1  |  **Applications**: Biological magnification of toxins
INTERACTING POPULATIONS FORM ECOLOGICAL COMMUNITIES

Mar. 4 Types and patterns of species diversity

Island biogeography

Chap. 27 (sections 1-5)

COMMUNITIES RECOVER FROM DISTURBANCE BUT NOT ALWAYS

Mar. 6 Primary & Secondary Succession

Communities can exist in several stable configurations

Applications: Climates change, communities change

Chap. 19 (sections 1-3)

POPULATIONS ARE INDIVIDUALS OF A SPECIES LIVING IN THE SAME PLACE AT THE SAME TIME

Mar. 8 Populations defined

Population structure

Density, distribution and dispersion

Applications: Finding rare species

Chap. 8

ALL POPULATIONS CAN GROW EXPONENTIALLY

Mar. 11 Simple exponential growth

Chap. 9

Mar. 13 Exponential growth and age structure

Exponential growth and stage structure

Sensitivity analysis

Applications: Human population growth

Chap. 10

NO POPULATION GROWS WITHOUT LIMITS

Mar. 15, 18 Density-Dependence (within species)

Mar. 20 Competition (between species)

Applications: Evolution of life histories and niches

Chap. 11

Mar. 22 Predator-prey dynamics

Chap. 14

Apr. 1 Exponential growth and stage structure

Sensitivity analysis

Applications: Volterra Principle

Chap. 15

Apr. 3 Herbivory

Parasitism

Mutualism

Applications: The value of mutualisms

Chap. 16

THE EVOLUTIONARY PLAY OCCURS IN AN ECOLOGICAL THEATER

Apr. 8 The process of evolution

The Hardy-Weinberg Law

Chap. 5

Apr. 10, 12 Mutation

Apr. 15 Drift

Natural selection

Readings to be assigned

Apr. 17, 19 Model of allele frequency change

Selection in the ‘real’ world on ‘real’ traits

Apr. 22 Speciation

Chap. 19

NOTHING IN BIOLOGY MAKES SENSE EXCEPT IN THE LIGHT OF EVOLUTION

Apr. 26 The evolution of sex and sexual selection

The evolution of behavior

Applications: Memes; the cultural equivalent of genes

Chap. 29

TO KEEP EVERY COG AND WHEEL IS THE FIRST PRECAUTION OF INTELLIGENT TINKERING

Apr. 29 The growing science of conservation biology

The value of biological diversity

Chap. 29

May 1 Extinction: Causes & Prevention

May 3 Emerging concepts in conservation biology

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