FES 100 - Introduction to Science and Biology: Topic #1

Principles of Science, Biology, Evolution

(Science for All Americans Online:
http://www.project2061.org/publications/sfaa/online/chap1.htm)
(Campbell and Reece p. 1-23, 441-446)

I. Objectives

A. Understand basic concepts for science

B. Understand basic concepts for biology

II. What is Science?

A. What you see – what you can observe

B. Observations made in an orderly process – "Scientific Method"

C. Helps to predict the future

D. Evolving process

E. Importance of defining science

1. "Science" is used to justify many policies.
2. Not everything labeled as scientific is based on science.
3. Science doesn't involve value judgments – just because something is scientific doesn't mean its "good" for us.

F. Theory.

G. The “art” of science.

H. Technology

III. Modern biological science.

A. Science first developed in physical sciences.

B. Some development in human health.

C. Basis for biological sciences developed in 1800’s.

1. Attributes of living entity.

2. Cell theory.

3. Level of biological organization, classifications
   a) Molecule:
   b) Organelle: .
   c) Cell: .
   d) Tissue:
   e) Organ:
   f) Organism.
   g) Species.
   h) Populations:
4. Evolutionary theory (Darwin 1859) – core theme in biology.
   a) Descended from a common ancestor – “Descent with modification”.
   b) Evolutionary change.

   c) Natural Selection - how species evolve.

D. Classification of life – Three domains

1. Archaea:
2. Bacteria:
3. Eucaryotic:
    a) Single cell: Protista
    b) Has tissues:
        (i) Plants:
        (ii) Fungi:
        (iii) Animals:

E. Understanding biology requires:

1. Understanding of **energy flow(6)** and structure
    a) Chemically complex
        (i) Hierarchical organization (3)
        (ii) Organized, complex structures
            (a) Cells (1)
            (b) Structure/function (9)
    b) Environment interactions (5)
    c) Regulation (4)
2. Understanding of **reproduction** and **evolution**
    a) Only cells regenerate cells (1)
    b) Heritable information (2)
    c) Evolution (8)
        (i) Adaptations
        (ii) Natural selection
    d) Unity and diversity (7)*:*
        (i) *Classification of life*
        (ii) *Populations evolve, not organisms*
3. Scientific inquiry (10) and technology (11)

IV. Key terms

adaptation
biology
cell theory
controlled experiment
descent with modification
evolution
evolve
hypothesis
inheritability
living
molecule
natural selection
observation
organ
organelle
organism
population
repeatable
science
scientific method
species
technology
theory
tissue