1. Overview and Housekeeping

   Introductions

   1. Announce course title and schedule for lecture and lab.

   2. Introduce myself and discuss my planned approach to this class and my expectations.

   3. In order to help me better prepare and put together lectures and other exercises, ask students to write on a sheet of paper and turn in to me, their name and what their career interests are, what they expect to gain from this course, and what they expect of me. Try to keep this brief, 5 minutes or less.

Syllabus for Biology II and other related topics

   1. Hand out hardcopy and review highlights of Syllabus for Biology II. Note that a copy will soon be available on my web site.

   2. Student Support Services. Student Support Services is a federally funded TRIO program supported by a grant from the U.S. Department of Education.
      - Eligible students receive free tutoring, counseling and transfer assistance through this program.
      - Students must apply for services and meet eligibility criteria established by the Department of Education, however, most students who attend DSCC are eligible for Student Support Services.
      - If you are interested in having a staff member meet with your class to provide more information about this program, please let me know or you can call 731-286-3389 or 901-475-3155.

   3. Cell Phones. Please turn cell phones off during classes and labs.

   4. My approach to lecture and lab will be
• As you can tell from the syllabus, our course here in Trenton will closely parallel and follow the Biology II course that Dr. Billy Williams helped design and is currently teaching on campus in Dyersburg.

• During lecture, I will make extensive use of the blackboard to provide course content and help you take notes. I highly recommend you take notes during class. Nearly all of the test material will come from lecture notes.

• At the beginning of each class period, I will provide you an outline of each day's lecture to help you keep up and organize your notes and to help me organize information and stay on schedule.

2. Diversity Among Organisms

Definition and discussion of diversity  (Textbook - 6, 926)

1. *Webster's New World Dictionary* (2ed.) defines *diversity* as difference or variety.

2. For living organisms what we are really talking about can be defined in the context of the term *biodiversity*.

3. Our textbook provides two definitions for the term. One is very simple and the other a tad more technical. For our purposes we will use the simple definition.

4. The simple definition is *Biodiversity is the variety of life on earth*.

5. How do we measure this? Any ideas?

6. How about numbers of species. Use example of an aquarium that has 2 species of fish and another with 15. Which aquarium has the highest biodiversity? This is often called species biodiversity.

7. How about variation in color? For example black bears can be blond, chocolate, black, and even cinnamon in color. Polar bears are normally only
white. In terms of body color which species of bear has the highest biodiversity? This is often called genetic biodiversity.

8. How about the complexity of habitats in a given area. Use example of farm that is totally cotton (a monoculture) vs an adjacent farm that has forest, grassland, and wetland habitats present). Which farm has more biodiversity?? This can be called habitat or ecological biodiversity.

9. Scientists estimate that our earth possess as many as 15 million species. Of that total, only 2 million have been identified and described.

**Naming living organisms** (Textbook - 5,8,9,310,342,343,344)

1. Before we proceed any further, we need to make sure we all know the definition of *species* and how they are named.

2. *A species is a group of similarly constructed organisms capable of interbreeding and producing fertile offspring.*

3. It is the taxon at the lowest level of the classification system.

4. Give some examples of species vs variations within species, (ie. Dogs, color phases of owls, etc)

5. Biologists assign species names using the *binomial system*. The system uses a set of standard rules to give species names that are standard and can be recognized anywhere in the world.

6. The name consists of two parts. The first word is the *genus* and the second denotes the *specific epithet*.

7. Carolus Linnaeus, from Sweden, developed this system and is considered the *father of taxonomy*. *Taxonomy* is the branch of science dealing with the naming of organisms.
Organizing and arranging living organisms into a classification system
(Textbook - 8) (Lab book - 85,86,87)

1. Classification is the ordering, ranking, and organizing living organisms into groups. These groups and their rankings or hierarchical relationships are:

- **Kingdom**
  - King
  - pharaoh's
- **Phylum**
  - Phillip
  - Play
- **Class**
  - Cook
  - Came
  - Chess
- **Order**
  - Ordered
  - Over
  - On
- **Family**
  - Fresh
  - From
  - Fred's
- **Genus**
  - Green
  - Germany
  - Green
- **Species**
  - Salad
  - Singing
  - Surfboard

2. Species are the building blocks.

3. Class exercise on classification. Classify and rank 4 hypothetical species. What were the criteria used to determine groups at each level of ranking. How would you like to do this for 2 million species rather than just 4?

3. Review of Classification of Living Organisms from Biology I (Lab book - 85,86,87)

The 5 kingdom classification system

1. Kingdom Monera
   - Bacteria
   - Blue-green algae
2. Kingdom Protista
   - Algae
   - Protozoa
3. Kingdom Fungi
   - Slime molds
   - True fungi
4. Kingdom Plantae (Metaphyta)
5. Kingdom Animalia (Metazoa)
4. **Introduction to Animal Kingdom** (Testbook-537) (Lab workbook-158-159)

**Reasons for study**

1. Basis for other scientific and professional fields
   - Examples include medicine, dentistry, veterinary medicine, teaching, agriculture, conservation, wildlife management.
   - These fields are responsible for improving and guarding our health, the health and well being of our pets and farm animals, protecting the environment and a host of other improvements for humans.
   - Can you think of any other examples?

2. Animals are used for scientific research
   - A large part of what we know about genetics has come from research using fruit flies.
   - Much of our knowledge of physiology and surgery has been gained through the use of animals
   - New drugs are usually tested on animals before human use and testing.
   - Without animal experimentation there would probably be no protection against rabies, smallpox, diphtheria, typhoid, and many other diseases.
   - Can you think of any other examples?

3. Animals serve as an important source of food and other products.
   - Almost every phylum of animals and class of larger animals contain a few species that reach out table. Examples include snails, mussels, oysters, lobsters, ants, grasshoppers, crabs, shrimp, fish, turtles, frogs, birds, and mammals.
   - Other products include sponges, corals, pearls and pearl buttons, honey, silk, feathers, furs, and leather.

4. Some animals may cause disease or are poisonous to humans
   - Some flatworms and roundworms are parasites of humans and some jellyfish, scorpions, spiders, fish, and snakes are poisonous to man.

**Important Characteristics**

1. All animals are *multicellular, eukaryotic*, and *heterotrophic*.

2. Most animal bodies exhibit all four divisions of labor. Includes cells - tissues - organs - systems

3. Most animals are *motile* but some like sponges are *sessile*.

4. Most reproduce sexually. Typical life cycle includes *sperm* and *egg* merging to form a *zygote* that develops into an *embryo* that develops into a *larvae* that matures into an *adult*. 
Criteria for classification of animals

1. **Body Plan.** There are two types.
   - **Sac plan** - One opening used both as an entrance for food and exit for waste.
   - **Tube within a Tube Plan** - There is a complete digestive tract with space between it and body wall.

2. **Number of germ cell layers.**
   - **Diploblastic** - body formed from two germ layers an ectoderm and an endoderm.
   - **Triploblastic** - body formed from three germ cell layers, an ectoderm, mesoderm, and endoderm.

3. **Larval Stages.**
   - A larva is an independent immature stage capable of acquiring its own food. Many water animals have free swimming larva. Animals that have similar larval stages are believed to be closely related, just as animals that have similar embryonic stages.

4. **Absence/Presence of a coelom.** A coelom is a cavity between the body wall and the gut or digestive tract. There are three conditions in the Animal Kingdom.
   - **Acoelomate** - There is no cavity between the gut and body wall.
   - **Pseudocoelomate** - A condition that exists in animals that lack a body cavity or in animals that have a cavity (coelom) that is incompletely lined with mesodermal tissue.
   - **Coelomate** - Animals with a cavity between the gut and body wall that is completely lined by tissue formed from the mesoderm. The internal organs and the inside surface of the body wall are lined with epithelial tissue called *peritoneum*.

5. **Segmentation.**
   - Also called metamerism.
   - This is a linear repetition of body parts. It is well illustrated by the earthworm and grasshopper.

6. **Skeleton.** There are two types.
   - **Exoskeleton** - skeleton on the outside or forms the outer covering of animal. Many invertebrates have exoskeletons.
   - **Endoskeleton** - skeleton on the outside and supports the animal from the inside. Vertebrates have endoskeletons.
7. **Appendages.**
   - These are structures that protude from the body of an animal that are used in locomotion and feeding.
   - Examples include tentacles, legs, fins, wings, and feet.

8. **Absence/Presence of Symmetry of Body Form.** There are 3 types.
   - **Asymmetrical** - No symmetry.
   - **Radial Symmetry** - A condition where body parts are regularly arranged around a central axis, like spokes of a wheel.
   - **Bilateral Symmetry** - An arrangement of body parts in which the right and left halves of the body are mirror images of each other.

9. **Homologous-Analogous Organs.**
   - **Homologous organs** are organs that are similar in **fundamental structure** and have a similar **embryologic origin**. An example is the forelimbs of a frog, the wings of a bird, and the arms of a man.
   - **Analogous organs** are organs with **similar functions** but have neither similar **fundamental structure** nor the same **embryonic origin**. An example is the wings of butterflies and the wings of birds.

The 10 animal phyla included in Biology II with one common example
(Lab workbook-87,88,160-205)

1. Phylum Porifera (sponges)
2. Phylum Coelenterata (marine corals)
3. Phylum Platyhelminthes (parasitic tapeworms)
4. Phylum Nemathelminthes (parasitic pinworms)
5. Phylum Annelida (earthworms)
6. Phylum Mollusca (snails)
7. Phylum Arthropoda (grasshoppers)
8. Phylum Echinodermata (starfish)
9. Phylum Hemichordata (acorn worms)
10. Phylum Chordata (frog)

5. **Summary**