BIO 130 **MODULE 1 (Class Notes)**
INTRODUCTION TO BIOLOGY **Student Name**: Shayla Melton

Section: 2

Instructions: Complete the class notes from the ppt slides. Use MS Words to fill in the blanks.

1. **Why Study of Biology Is Important?** To be an informed citizen

   An understanding of biology is important to address a number of social issues today. DNA testing, birth control , global warming, and AIDS.

2. **What is Biology?** Biology is the science that deals with living things & how living things interact with the things around them.

3. **What is science?** A process used to solve problems and understand natural events. It involves the scientific method.

4. **The Scientific Method:** A way of gaining information about the world that involves: ***forming possible solutions to questions; *rigorous testing to determine if the solutions are supported; *continual checking and rechecking to make sure that previous conclusions are still supported; * modification of unsupported conclusions.

5. **Components of the Scientific Method:** 1. Observation; 2. Questioning and exploration; 3. Constructing hypotheses**;** 4. Testing of hypothesis (Experimentation); 5. Conclusion and Communication

6. **Observation, Questioning, and Exploration:** An observation is a thoughtful and careful recognition of an event or a fact. The information gained by direct observation of an event is called the empirical evidence. The careful observation of a phenomenon leads to a question. How does this happen? What causes it to occur? The question must be testable. Scientists then explore scientific publications to find any information that has been gathered about the question.

7. **Constructing Hypotheses:** Once the question is asked, scientists propose questions. These answers are hypotheses. **Hypotheses must:** be logical. Account for all current information. Be testable. Make the least possible assumptions. **Testing Hypotheses:** Hypotheses need to be tested to see if they are supported or disproved. Disproved hypotheses are rejected. Hypotheses can be supported but not proven. One way to test a hypothesis: is Experimentation.

8. **Experimentation:** An experiment is a re-creation of an occurrence. It tests whether or not the hypothesis can be supported or rejected. Scientific Experiments are called controlled experiments. .They include two groups. There is only one difference (variable) between the two groups. Experimental group: One variable is altered. Control group: No variable is altered. Controls are necessary in scientific experiments because they serve as a basis for comparison with the experimental results.

9. **A Sample Experiment:** ***Hypothesis**: Male sex hormones produced by the testes stimulate male birds to sing. *Experimental group: Male birds with testes removed at birth. *Control group: Male birds subjected to a similar surgery that were allowed to develop normally with testes. *Data: Male songbirds without testes do not exhibit singing behavior. *Conclusion: Hypothesis is supported.

10. **Experimental Data:** Experiments must be repeated several times (replication). The results should be VALID (meaningful) & RELIABLE (give the same results every time). If the hypothesis is supported by ample experimental data, it leads to a theory.

11. **Theory:** A theory may be defined as a widely accepted, general statement about a fundamental concept in science. Theories continue to be tested. Exceptions identified. Modifications made.

12. **A Scientific Law:** A scientific law is a uniform and constant fact of nature that describes what happens in nature. An example: All living things come from pre-existing living things.

13. **Scientific Communication:** Data is shared with the scientific community through research articles published in scientific journals. Scientists present preliminary data at conferences. Scientists collaborate directly by phone and e-mail.

14. **Science vs. Nonscience:** Science is distinguished from non-scientific areas of study by the way information is gathered. Scientists continually challenge and test principles to determine cause-and-effect relationships. EX. Biology, Physics, Chemistry, Astronomy. Nonscientists cannot test their hypotheses directly and often cannot establish cause-and-effect relationships. EX. History, Literature, Philosophy, Art, Sociology, etc.

15. **Pseudoscience:** A deceptive practice that uses the language of science to convince people into thinking that a claim has scientific validity**.** Pseudoscience may interpret scientific facts to deceive. Marketing claims of nutritional supplements. Marketing claims of organic foods

16. **The Science of Biology:** Biology is the study of living things. Theoretical biology: Evolutionary biology, animal behavior, biochemistry. Appalled biology: Medicine, crop science, plant breeding, wildlife management.

17. **Characteristics of Living Things:** There are five characteristics of life. 1. Metabolic process. 2. Generative process. 3. Responsive process. 4. Control process. 5. Unique structural organization.

1. **Metabolic processes**: All the chemical reactions that take place within your body are known as metabolism. A. Nutrient uptake. B. Nutrient processing. C. Waste Elimination
2. **Generative processes: A.** Growth: increase in size. B. reproduction: increase in number of individuals in a population. Organisms reproduce either sexually or asexually.
3. **Responsive processes:** Organisms react to changes in their environment.
   A. Irritability: the ability to recognize that something in its surroundings has changed (a stimulus) and respond to it quickly. B. Individual adaptation: a longer term response to an environmental change. C. Population adaptation: (Evolution): the whole population of a species adapts to a change in environment. Changes in the human species since the time of first humans in an example of evolution.
4. **Control processes:** Enable organisms to carry out metabolic processes in the right order. A. Coordination: Enzymes coordinate metabolic reactions. B. Regulation: Enzymes are regulated in order to maintain homeostasis.
5. **Unique structural organization:** Organisms are made of cells.

18. **Levels of Biological Organization: 1.** Biosphere the worldwide ecosystem.
    2. Ecosystem communities that interact with one another in a particular place.

3. Communities: populations of different organisms interacting with each other in a particular place.
4. Population: a group of individual organisms in a particular place.
5. Organism: an independent living unit.
6. Organ system: many organs that perform a particular function.
7. Organ: many tissues that perform a particular function.
8. Tissue: many cells that perform a particular function.
9. Cell: simplest unit that shows characteristics of life.
10. Molecules: specific arrangements of atoms.
11. Atoms: the fundamental units of matter

19. The Significance of Biology in Our Lives: Biology has significantly contributed to our high standard of living. For example: * Advanced food production *Advances in disease control; *Advances in plant and animal breeding *Advances in biotechnology; *Progress in genome studies