**General Biology 141 (BI141)**

**Proposed Course Description:**

This is the first of a two-semester course covering the central concepts of biology. Topics include the chemical and cellular basis of life, energy transformations, and classical and molecular genetics. Laboratory exercises mirror lecture topics and include opportunities for the student to practice the scientific method, data collection, and lab report writing.

**Student Learning Outcomes Lecture:**

1. The student will be able to describe the properties of life and the hierarchical nature of the living world.
2. The student will be able to define evolution and relate how evolution has produced both unity and diversity of life.
3. The student will be able to describe how science is an investigative process.
4. The student will be able to describe how the structure of water affects physical and biological properties of living things.
5. The student will be able to describe how the structure of the different classes of organic compounds/biomolecules is related to their function.
6. The student will be able to identify the parts of the cell and describe the role each organelle has in the life of the cell.
7. The student will be able to describe how the physical structure of the cell membrane affects the passage of material through the cell membrane.
8. The student will be able to describe enzymes and how they operate in a living environment.
9. The student will assess how the laws of thermodynamics apply to living systems and be able to defend how the kinetic molecular theory is the basis for life's metabolic pathways.
10. The student will be able to describe how the energy needed to combat entropy is harvested from the chemical bonds of glucose during cellular respiration.
11. The student will be able to describe the metabolic pathways related to the photosynthetic production of glucose in plant cells.
12. The student will be able to identify and define the purpose of and steps in both mitosis and meiosis.
13. The student will be able to describe the meiotic process and explain how the meiotic process relates to classical Mendelian genetics.
14. The student will be able to describe the Mendelian laws of segregation and independent assortment and be able to use these laws to solve monohybrid and dihybrid genetic crosses.
15. The student will be able to solve genetic problems involving the principles of linkage and sex-linked traits, and be able to use the concept of recombination data to map a chromosome's genetic loci.
16. The student will be able to describe the structure of the DNA molecule and explain how its structure is fundamental to its role as the genetic molecule.
17. The student will be able to explain how information stored in a cell's chromosomes directs activities within the cell's cytoplasm through the processes of transcription and translation.
18. The student will be able to describe some of the tools used in biotechnology.

**Student Learning Outcomes Laboratory:**

1. The student will produce a taxonomic key and will use prepared taxonomic keys to identify selected living organisms.
2. The student will use the compound microscope to focus on biological specimens. The student will also be able to distinguish between animal and plant cells/tissues.
3. The student will construct examples of organic biological molecules to differentiate between the classes of biomolecules.
4. The student will demonstrate the skills of observation, data collection, and data analysis while investigating the processes of osmosis and enzyme catalysis. Scientific lab reports will be written.
5. The student will be able to identify the stages of both mitosis and meiosis and will be able to identify what these processes are used for in both plants and animals.
6. The student will use corn as a model for demonstrating Mendel’s first and second laws of inheritance. The student will demonstrate an understanding of monohybrid and dihybrid crosses, methods used to solve genetics problems, and pedigree analyses.
7. The student will use models of DNA to relate its three-dimensional shape to its biological functions. DNA replication, transcription, and translation will be explored.
8. The student will practice techniques used in biotechnology.

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 ***Lecture Topic Schedule***

**Week # Topic Chapter**

1 Introduction to the BI141

 The Study of Life Chapter 1

2 The Chemical Foundation of Life Chapter 2

3 Biological Macromolecules Chapter 3

4 Cell Structure Chapter 4

5 Structure and Function of Plasma Membranes Chapter 5

6 Mitosis and Meiosis Chapters 10 and 11

7 Metabolism Chapter 6

8 Cellular Respiration Chapter 7

9 Photosynthesis Chapter 8

10 Mendel’s Experiments and Heredity Chapter 12

Genetics Problems Part 1

11 Modern Understandings of Inheritance Chapter 12

Genetics Problems Part 2

12 DNA Structure and Function Chapter 14

13 Genes and Proteins Chapter 15

14 Introduction to Biotechnology Chapter 17

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***LAB Schedule***

**Week # Topic**

1 Taxonomic Keys

2 Compound Microscope

3 Introduction to Organic Molecules

4 Selected Animal Tissues

5 **Membrane Diffusion and Osmosis Experiment**

6 How to Write a lab Report and Peer Review

7 Mitosis/Meiosis

8 **Enzyme Catalysis Experiment**

9 **Cellular Respiration**

10 Introduction to Genetics Part 1

11 Introduction to Genetics Part 2

12 An Investigation of Nucleic Acids

13 **Introduction to DNA Technology**

**DNA Isolation using Cheek Epithelial Cells**

 **pGLO Bacterial Transformation**

14 **Analysis of pGLO**

**\*\*Bold indicates experimental labs that will require you to perform an experiment and produce either a lab report or data report.**