CURRICULUM GUIDE

NAME OF COURSE: COLLEGE PREP BIOLOGY B

COURSE NUMBER: 414 **WRITTEN / REVISED :** JULY , 2006

LEVEL OF COURSE: COLLEGE PREP B **NUMBER OF CREDITS:** SIX (6)

PREREQUISITES: "C" IN FOUNDATIONS OF SCIENCE B

GRADE LEVELS OFFERED TO: 10th

COURSE DESCRIPTION:

This course is a lab oriented college prep course in biology. It requires a some knowledge of the life sciences with emphasis on hands-on activities and sound environmental values.

COURSE OBJECTIVES:

The student should be expected to succeed in the following objectives to the satisfaction of both the teacher and student.

1. Demonstrates the ability to set reasonable goals.
2. Demonstrates the responsibility for carrying out self-set goals.
3. Demonstrates cooperation by working constructively with other students.
4. Demonstrates cooperation with the instructor by using time constructively and with purpose, relative to course oriented goals.
5. Demonstrates cooperation with the instructor by performing requested special program oriented tasks.
6. Demonstrates independence by exploring all possible avenues in the solution of problems with the minimum of help.
7. Demonstrates independence and scholastic growth by using resources efficiently.
8. Progresses at a rate satisfactory to the teacher.

CORE CURRICULUM CONTENT STANDARDS ADDRESSED:

- **5.1 - Scientific Process –** Habits of Mind, Inquiry and Problem Solving, Safety
- **5.2 - Science and Society –** Cultural Contributions, Historical Perspectives
- **5.3 - Mathematics Application –** Numerical Operations, Geometry and Measurement Patterns and Algebra, Data Analysis and Probability
- **5.4 - Nature and Process of Technology –** Science and Technology, Nature of Technology, Technological Design
- **5.5 - Life Science –** Matter, Energy and Organization in Living Systems, Diversity and Biological Evolution, Reproduction and Heredity
- **5.6 - Physical Science – Chemistry –** Structure and Property of Matter, Chemical Reactions
- **5.10 – Environmental Studies –** Natural Systems and Interactions, Human Interactions and Impact

SPECIFIC BEHAVIORAL OBJECTIVES/PROFICIENCIES AND TIME LINES:

Chapter 1 – The Nature of Life **Time = 8 days**

Goal: The student will gain an understanding of the methods of science and the characteristics of living organisms.

Objectives:

1. Explain what the goal of science is.
2. Explain what a hypothesis is.
3. Describe how scientists test hypotheses.
4. Explain how a scientific theory develops.
5. Describe some characteristics of living things.
6. Explain how life can be studied at different levels.
7. Describe the measurement system that scientists use.
8. Explain how light microscopes and electron microscopes are similar and different.
9. Explain why it is important to work safely in biology.

Audio/Visual:

1. Video: The Unknown World

Assignments:

1. Workbook A: Sections 1-2, 1-3. pgs. 5-9
2. Workbook B: pgs. 5-8.

Recommended Lab Activities:

1. Making Metric Measurements.
2. Using Graphing Skills.
3. Lab Skills: Obscertainers.
4. Using a Compound Light Microscope

Evaluation:

1. Homework/classwork.
2. Chapter test.
3. Graded labs.

Chapter 2 - The Chemistry of Life **Time = 13 days**

Goal: The student will recognize the basic concepts in Biochemistry including; chemical compounds, bonds, chemical reactions, and organic molecules of life.

Objectives:

1. Identify the three subatomic particles in atoms.
2. Explain isotopes and their use in biology.
3. Explain what chemical compounds are.
4. Describe the two main types of chemical bonds.
5. Differentiate between solutions and suspensions.
6. Explain what acidic and basic solutions are.
7. Describe the functions of each group of organic compounds.
8. Explain how chemical reactions affect chemical bonds in compounds.

9. Explain why enzymes are important to living things.

Audio/Visual:
1. Overheads --- atoms/molecules.
2. Overheads --- Bonding, Covalent/Ionic.
3. pH Scale

Assignments:
1. Workbook A: Sections 2-2
2. Workbook B: pgs 12-16, 18-19

Recommended Lab Activities:
1. Constructing Molecular Models.
2. Identifying Organic Compounds.

Evaluation:
1. Homework/Classwork.
2. Graded Labs.
3. Chapter Quizzes/Test.

Chapter 3 – The Biosphere Time = 5 days

Goal: The students will identify relationships among various types of organisms that they have observed in their immediate environment.

Objectives:
1. Identify the levels of organizations that ecologists study.
2. Describe the methods used to study ecology.
3. Identify the sources of energy for life processes.
4. Trace the flow of energy through living systems.
5. Evaluate the efficiency of energy transfer among organisms in an ecosystem.

Audio/Visual:
1. Overhead: levels of organization

Assignments:
1. Workbook B: pgs 23-24, 30

Recommended Lab Activities:
1.

Evaluation:
1. Homework/Classwork.
2. Graded Labs.

Chapter 4 – Ecosystems and Communities Time = 5-7 days

Goal: Students will be able to identify relationships among different organisms and between organisms and nonliving factors in a model ecosystem.

Objectives:

1. Explain how biotic and abiotic factors influence an ecosystem.
2. Identify the interactions that occur within communities.
3. Describe how ecosystems recover from a disturbance.
4. Review the biomes found around the world.

Audio/Visual:
1. Plant Video

Assignments:
1. Workbook B: pgs 35-38

Recommended Lab Activities:
1. Biome brochure
2. Observing Succession (found in Teaching Resources Pgs. 49-51)

Evaluation:
1. Homework/Classwork.
2. Graded Labs.

Chapter 5 – Populations **Time = 3 days**

Goal: Student will be able to understand what factors affect the rate of populations.

Objectives:
1. Identify factors that affect population size.
2. Identify factors that limit population growth.

Audio/Visual:
1. Clip from Guppy Lab

Assignments:
1. Workbook B: pg 45

Recommended Lab Activities:
1. Sex and the Single Guppy
2. Predator Prey lab

Evaluation:
1. Homework/Classwork.
2. Graded Labs.

Chapter 6 – Humans in the Biosphere **Time = 3 days**

Goal: Students will understand the difference between renewable and nonrenewable resources.

Objectives:
1. Explain how environmental resources are classified.

2. Describe how human activities affect land, air, and water resources.
3. Describe two types of global change that are of concern to biologists.

Audio/Visual:

Assignments:
1. Workbook B: pg 56
2. Issues and Decisions:

Recommended Lab Activities:
1. Investigating Air and Water Pollution

Evaluation:
1. Homework/Classwork.
2. Graded Labs.
3. Unit Test

Chapter 7 – Cell Structure and Function Time = 10-12 days

Goal: The students will be able to form an operational definition of the term cell and classify them into two or more groups.

Objectives:
1. Explain what the cell theory is.
2. Describe how researchers explore the living cell.
3. Distinguish between eukaryotes and prokaryotes.
4. Describe the function of the cell nucleus.
5. Describe the functions of the major cell organelles.
6. Identify the major roles of the cytoskeleton.
7. Identify the major functions of the cell membrane and the cell wall.
8. Describe what happens during diffusion.
9. Explain the process of osmosis, facilitated diffusion, and active transport.
10. Describe cell specialization.
11. Identify the organizational levels in multicellular organisms.

Audio/Visual:
1. Movie: Bill Nye “The cell”

Assignments:
1. Workbook A: Sections 7-1, pgs 75, 79, 81-82
2. Workbook B: pgs 64-72
3. Issues and Decision Making:

Recommended Lab Activities:
1. Observing Osmosis p 85 (Lab book A)
2. Comparing Plant and Animal cells
3. Investigating Cell Structures and Processes (Teacher Resources pgs. 89-92)

Evaluation:
1. Homework/classwork
2. Graded Labs
3. Chapter Test.

Chapter 8 - Photosynthesis Time = 3 days

Goal: The students will be able to understand how photosynthetic organisms obtain energy from sunlight.

Objectives:
1. Explain where plants get the energy that they need to produce food.
2. Describe the role of ATP in cellular activities.
3. State the overall equation for photosynthesis.

Audio/Visual:
1. Overhead: chloroplast
2. Movie: Bill Nye "Photosynthesis"

Assignments:
1. Workbook B: pg 75
2. Issues and Decision Making:

Recommended Lab Activities:
1. Photosynthesis: Paper chromatography
2. Cell Energy

Evaluation:
1. Homework/classwork
2. Graded Labs

Chapter 9 – Cellular Respiration Time = 2 days

Goal: The students will be able to understand how organisms obtain energy through cellular respiration.

Objectives:
1. Explain what cellular respiration is.
2. State the overall equation for cellular respiration.

Audio/Visual:
1. Overhead: Mitochondria

Assignments:
1. Workbook B: pg 89

Recommended Lab Activities:
1. Investigating Fermentation by Making Kimchi (Teacher Resource pgs. 113-115)

Evaluation:
1. Homework/classwork
2. Photosynthesis/cell respiration quiz.

Chapter 10 – Cell Growth and Division Time = 7 days

Goal: The students will gain an understanding of the basic cell processes, optimum size of cells, phases of Mitosis, Cell Cycle and cell specialization.

Objectives:
1. Describe how cell division solves the problems of cell growth.
2. Name the main events of the cell cycle.
3. Describe what happens during the four phases of Mitosis.
4. Identify a factor that can stop cells from growing.
5. Describe how the cell cycle is regulated.
6. Explain how cancer cells are different from regular cells.

Audio/Visual:
1. Overhead – Mitosis.
2. Overheads – Visualizing the Cell Cycle.
3. Video: Cancer Warrior

Assignments:
1. Workbook A: pgs 108-110
2. Workbook B: pgs 94-98
3. Stem cell article
4. Mitosis foldable

Recommended Lab Activities:
1. Observing Specialized Cells: Lab book B pg 95

Evaluation:
1. Homework/classwork
2. Graded Labs
3. Chapter Test.

Chapter 11 – Intro to Genetics Time = 12 days

Goal: The student will discuss genetics and describe where chromosomes and genes are located and what their jobs are.

Objectives:
1. Describe how Mendel studied inheritance in peas.
2. Summarize Mendel's conclusions about inheritance.
3. Explain the principle of dominance.
4. Describe what happens during segregation.
5. Explain how geneticists use the principles of probability.
6. Describe how geneticists use Punnett squares.
7. Describe the inheritance patterns that exist aside from simple dominance.

8. Explain how Mendel's principles apply to all organisms.
9. Contrast the chromosome number of body cells and gametes.
10. Summarize he events of meiosis.
11. Contrast the processes of mitosis and meiosis.

Audio/Visual:
1. Overhead: meiosis
2. Movie: Life's greatest miracle

Assignments:
1. Workbook A: pg 117, 122-123, 126
2. Workbook B: pgs 102-106
3. Punnett square worksheets: one trait
4. Compare/Contrast Table (Teacher Resource pg. 139)

Recommended Lab Activities:
1. How can genes of offspring be predicted?
2. Face lab

Evaluation:
1. Homework/classwork
2. Graded Labs
3. Chapter Test.

Chapter 12 – DNA and RNA **Time = 10 days**

Goal: The students will examine the appearance and function of DNA, RNA, and the possible errors in the DNA code.

Objectives:
1. Summarize the relationship between genes and DNA.
2. Describe the overall structure of DNA.
3. Summarize the events of DNA replication.
4. Relate the DNA molecule to chromosome structure.
5. Tell how RNA differs from DNA.
6. Name the three main types of RNA.
7. Identify the genetic code.
8. Describe transcription.
9. Summarize translation.
10. Explain the relationship between genes and proteins.
11. Contrast gene mutations and chromosomal mutations.

Audio/Visual:
1. Overheads - DNA/cell, DNA copy
2. Video - Murder/Rape/DNA

Assignments:
1. Workbook A: pgs 129-130

2. Workbook B: pgs 110-116, 118

Recommended Lab Activities:
1. DNA Model Lab
2. Extracting Strawberry DNA
3. Codon Bingo

Evaluation:
1. Class/Homework
2. Labs
3. Test

Chapter 13 – Genetic Engineering Time= 6-7 days

Goal: The students will be able to understand breeding and how to manipulate DNA.

Objectives:
1. Explain the purpose of selective breeding.
2. Describe two techniques used in selective breeding.
3. Tell why breeders try to induce mutation.
4. Explain how scientists manipulate DNA.

Audio/Visual:
1. Video: "DNA revolution"
2. Video: Gattaca

Assignments:
1. Workbook B: pgs 122, 124
3. Issues and Decision Making: Should genetics be used to improve humans? P 27

Recommended Lab Activities:
1. Online: "It Takes a Lickin'"

Evaluation:
1. Class/Homework
2. Labs
3. Test

Chapter 14 – The Human Genome Time= 7 days

Goal: The students will understand human heredity and factors that affect the human genome.

Objectives:
1. Identify the types of human chromosomes in a karyotype.
2. Explain how sex is determined.
3. Explain how pedigrees are used to study human traits.
4. Describe examples of the inheritance of human traits.
5. Explain how small changes in DNA cause genetic disorders.
6. Identify characteristics of human chromosomes.

7. Describe some sex linked disorders, and explain why they are more common in males than females.
8. Summarize nondisjunction and the problems it causes.
9. Summarize methods of human DNA analysis.
10. State the goal of the Human Genome Project.
11. Describe how researchers are attempting to cure genetic disorders.

Audio/Visual:
1. Movie: The Science of the Sexes: Gender roles
2. Nova: Cracking the Code: online or VHS

Assignments:
1. Workbook A: pgs 157-159, 160-162, 166
2. Workbook B: pgs 129-132
3. Issues and Decision Making: Should doctors predict genetic disorders? P 19
4. Issues and Decision Making: Should the results of the HGP be sold for profit? Pg 24
5. Issues and Decision Making: Genetic testing for breast cancer? Pg 26
6. Issues and Decision Making: Who should have access to genetic info? Pg 28

Recommended Lab Activities:
1. Karyotype
2. Online genetic research
3. Pedigrees

Evaluation:
1. Class/Homework
2. Labs
3. Test

Chapter 15 – Darwin's Theory of Evolution Time = 8 days

Goal: The students will be introduced to natural selection, mutations and species formation. Evidence supporting evolution will also be examined.

Objectives:
1. Describe the pattern that Darwin observed among organisms of the Galapagos Islands.
2. State how Hutton and Lyle described geological change.
3. Identify how Lamarck thought species evolved.
4. Describe Malthus's theory of population growth.
5. List events leading to Darwin's publication of *On the Origin of Species*.
6. Describe how natural variation is used in artificial selection.
7. Explain how natural selection is related to species' fitness.
8. Identify evidence Darwin used to preset his case for evolution.
9. State Darwin's theory of evolution by natural selection.

Audio/Visual:
1. Peppered moth lab.

2. Movie: Galapagos: Into the Wild

Assignments:
1. Workbook B: pgs 138-139, 141-142

Recommended Lab Activities:
1. Natural Selection: Beans
2. Evidence of Evolution: Anatomical structures
3. Comparing Adaptations of Birds
4. Evolution of a horse

Evaluation:
1. Class/Homework
2. Labs
3. Test

Chapter 32- Section 3 – Primates and Human Origins Time = 4 days

Goal: Students will understand the characteristics of primates and discover the theory of the evolution of man.

Objectives:
1. Identify the characteristics that all primates share.
2. Describe the major evolutionary groups of primates.
3. Explain the current scientific thinking about hominid evolution.

Audio/Visual:
1. Movies: Lucy Series
2. Movies: Evolution Series

Assignments:
1. Workbook A: pgs 387-388
2. Workbook B: pgs 319-321
3. Teacher resource: pg 403

Recommended Lab Activities:
1. Hands of Primates
2. Evolutionary Changes in Primates

Evaluation:
1. Class/Homework
2. Labs

Chapter 18 – Classification Time = 4 days

Goal: Students will be able to demonstrate the classification scheme and discover the basic characteristics of domains and kingdoms.

Objectives:

1. Explain how living things are organized for study.
2. Describe binomial nomenclature.
3. Explain Linnaeus's system of classification.
4. Name the six kingdoms of life as they are now identified.
5. Describe the three domain system of classification.

Audio/Visual:
1. Overhead: six kingdoms

Assignments:
1. Workbook A: pgs 203-204
2. Workbook B: pgs 168, 171-172

Recommended Lab Activities:
1. Using and Making a Biological Key
2. Classification

Evaluation:
1. Class/Homework
2. Labs
3. Chapter Quiz

Chapter 35 – Nervous System Time = 12 days

Goal: Students will explore the body's major system of communication, the nervous system.

Objectives:
1. Describe how the human body is organized.
2. Explain homeostasis.
3. Identify the functions of the nervous system.
4. Describe how a nerve impulse is transmitted.
5. Identify the functions of the Central Nervous System.
6. Describe the functions of the two divisions of the Peripheral Nervous System.
7. Name the five types of sensory receptors.
8. Identify the five sense organs.

Audio/Visual:
1. Movie: Killer on Campus
2. Movie: Brain movie - drugs

Assignments:
1. Workbook A: pgs 411, 415-416
2. Workbook B: pgs 345-351, 353

Recommended Lab Activities:
1. Brain Functions
2. Which side is dominant?
3. Understanding the Senses

Evaluation:
1. Class/Homework
2. Labs
3. Chapter Test

Chapter 36 – Skeletal, Muscular and Integumentary Time = 7 days

Goal: Students will study the structure, function, and associated problems of the skeletal and muscular systems**.**

Objectives:
1. State the functions of the skeletal system.
2. Describe the structure of a typical bone.
3. Explain how bones develop.
4. Identify the three different kinds of joints.
5. Describe the three types of muscular tissue.
6. Explain how muscles contract.
7. Explain why exercise is important.
8. State the functions of the Integumentary system.
9. Describe the structure of hair and nails.

Audio/Visual:
1. Overhead: typical bone structure
2. Nova: The Universe Within: Muscle and bone

Assignments:
1. Workbook A: pgs 425-427
2. Workbook B: pgs 357-363
3. Technology Society article: Making artificial skin: textbook p 932

Recommended Lab Activities:
1. What causes sports injuries?
2. Difference between male and female skeletons
3. Comparing bones, joints, and muscles: Lab manual B p233

Evaluation:
1. Class/Homework
2. Labs
3. Chapter test

Chapter 37 – Circulatory and Respiratory Systems Time = 8- 10 days

Goal: The students will examine the roles of the circulatory system and the respiratory system in the human body, and illnesses associated with both.

Objectives:
1. Identify the functions of the human circulatory system.

2. Describe the structures of the circulatory system.
3. Name the three types of blood vessels in the circulatory system.
4. Describe blood pressure.
5. Describe blood plasma.
6. Explain the functions of white blood cells, red blood cells, and platelets.
7. Describe respiration.
8. Identify the function of the respiratory system.
9. Describe gas exchange in breathing.
10. Explain how smoking affects the respiratory system.

Audio/Visual:
1. Video clip from: The Science of the Sexes: Gender roles

Assignments:
1. Workbook B: pgs 367-374

Recommended Lab Activities:
1. Investigating the Heart: Lab manual B pg 239
2. Measuring Lung Capacity: Lab manual A pg 261

Evaluation:
1. Class/Homework
2. Labs
3. Chapter Test

Chapter 38 – Digestive and Excretory Systems Time = 8 days

Goal: Students will understand the roles of the digestive and excretory systems and the disorders associated with both.

Objectives:
1. Explain how food provides energy.
2. Describe the nutrients your body needs.
3. State why water is such an important nutrient.
4. Explain how to use the food guide pyramid.
5. Identify the organs of the digestive system.
6. Describe the function of the digestive system.
7. Identify the functions of the kidneys.
8. Explain how blood is filtered.

Audio/Visual:
1. Overhead of Digestive System
2. Video: "Breakdown"
3. Video: "Universe Within"
4. Video: Water

Assignments:

1. Workbook A: pgs 449-451
2. Workbook B: pgs 378-381, 383

Recommended Lab Activities:
1. Observing Chemical and Mechanical Digestion: Lab manual B pg 243
2. External and Internal Anatomy of the Frog

Evaluation:
1. Class/Homework
2. Labs
3. Chapter Test

Chapter 40 – Immune System Time = 5 days

Goal: Students will understand the role of the immune system and the diseases associated with it.

Objectives:
1. Identify the causes of disease.
2. Explain how infectious diseases are transmitted.
3. Describe how antibiotics fight infection.
4. Identify the body's nonspecific defenses against invading pathogens.
5. Describe the function of the immune system.
6. State what happens when the immune system overreacts.
7. Explain what an autoimmune disease is.

Audio/Visual:
1. Video

Assignments:
1. Workbook A: pgs 476, 480
2. Workbook B: pg 402

Recommended Lab Activities:

Evaluation:
1. Class/Homework
2. Labs

Chapter 19 – Bacteria and Viruses Time = 12 days

Goal: Students will discover the main characteristics of bacteria and viruses and how they cause disease.

Objectives:
1. Explain how the two groups of prokaryotes differ.
2. Describe the factors that are used to identify prokaryotes.
3. Describe the structure of a virus.
4. Explain how viruses cause infection.

6. Explain how bacteria and viruses cause disease.

Audio/Visual:
1. Video: Emerging viruses
2. Video: Outbreak

Assignments:
1. Workbook A: pg 220
2. Workbook B: pgs 177-183
3. Issues in Biology: Should mass vaccinations be required? text p 484

Recommended Lab Activities:
1. Virus Replication
2. Observing Bacteria

Evaluation:
1. Class/Homework
2. Labs

MATERIALS / RESOURCES:

Text: Biology – Miller, Levine - 2006

Labs: Teacher generated and selected.

Audio-Visual: As selected by instructor.

EVALUATION:

A. STUDENT PROGRESS:

The evaluation of student progress in the objectives cited on the previous pages will be primarily by, but not limited to, the following criteria:

1. Classroom/Homework performance 20%-30%

2. Unit Tests and Quizzes	35%-50%
3. Laboratory Reports	25%-35%

B. PERIODIC EVALUATION OF OBJECTIVES AND GUIDE:

Next evaluation due June, 2009

C. SPECIAL COURSE POLICIES:

The emphasis on laboratory discovery of scientific principles requires active student participation by students. The student is responsible for outside reading of the textbook, laboratory book, or worksheets and to question the teacher during lecture, if necessary. The typical week in Biology might include a division of the six periods of instruction in the following way: three periods of lecture-demonstrations, two periods of laboratory work and one-half period of independent research/reading and one-half period for audiovisual aids, i.e., filmstrips, film, or slides.

High Point Regional High School's curriculum and instruction are aligned to the State's Core Curriculum Content Standards and address the elimination of discrimination by narrowing the achievement gap, by providing equity in educational programs and by providing opportunities for students to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectionate or sexual orientation, gender, religion, disability or socioeconomic status.