Biology

4225

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BIOLOGY - 4225

Course Description:	**This academic course is designed to develop an awareness of life concepts and their relationships to the individual as well as facts of a biological nature that will be practical in everyday living. From the molecular level, to the structure and functions of organisms, biology will be presented in a way which permits the student to understand the living world and their role in it, to solve problems and prepare for future studies. Critical and creative thinking skills will be developed. Biological information will be presented in detail following the scope of the book. Laboratory experience is required of all students.**
Grade Level:	10^{th}, 11^{th}, or 12th
Length of Course:	Frequency: 7 periods per 6 day cycle Duration: 42 minutes Length: full year course Credits: 1
Prerequisites:	Successful completion of Earth and Space Science
Textbook:	Biology: The Study of Life, 7^{th} edition
Expected Level of Achievement	Students will be expected to maintain a 70% or better. They will be required to attend class prepared to learn. The final grade is determined as per school policy and scale: 93-100% = A 85 – 92% = B 77 – 84% = C 70 – 76% = D Below 70% = F

Northern York County School District Curriculum

Course Name:	Biology
Content:	The Nature of Life
Key Learning(s):	Life Characteristics and Life Processes
Essential Question(s):	How do we distinguish living from non-living things? How do the eight life processes maintain homeostasis in organisms? What role do the life processes play in metabolism?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.2.10B 3.1.10E 3.2.10C 3.2.10A	Apply process knowledge and organize technological phenomena in varied ways Describe patterns of change in nature, physical and man made systems Apply the elements of scientific inquiry to solve problems Apply knowledge and understanding about the nature of scientific and technological knowledge	The students will describe how the existence and life functions of all living things demonstrate both unity and diversity. The students will define the terms biology and organism. The students will list nice general characteristics that distinguish living things from non-living things. The students will name and define the eight life processes by which the life of an organism is maintained. The students will learn to distinguish between homeostasis and metabolism. The students will categorize the diversity of life. The students will define homeostasis.	Notebook Oral presentation and explanation ABC's of Biology Written quizzes Performance-based. Written objective test Word Splash Learning Activity "Life Processes" Class participation Critical and creative thinking laboratory "Looking Closely at Living things"	Textbook Instructor generated handouts Supplemental tests Lab equipment Learning Activity "Asking Questions about Biology" CD-Rom Discovery Learning Flashcards

Northern York County School District Curriculum

Course Name:	Biology
Content:	Biology As A Science
Key Learning(s):	The Scientific Method and Tools of the Biologist
Essential Question(s):	How is the scientific method used to find answers to questions and to solve problems? Why are instruments necessary for scientific research? What are the parts of a compound light & microscope and what is the function of each part?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.1.10B 3.2.10C 3.7.10A	Describe concepts of models as a way to predict and understand science and technology Apply the elements of scientific inquiry to solve problems Identify a safety use of a variety of tools and materials to	The students will describe and demonstrate the use of instrumentation. The students will interpret scientific observation and measurement through controlled experiments The students will demonstrate biological tools utilized in scientific investigation. The students will learn the steps of a scientific investigation. The students will explain what is meant by a controlled experiment. The students will conduct a multiple step experiment. The students will organize experimental information. The students will develop scientific observation and measurement through controlled experiments.	Section reviews Chapter reviews Notebooks Critical and creative thinking Evaluating first hand observations Lab practical Skills application Written quiz Microscope demonstration	Compound light microscope Mystery box Textbook Learning Activity “Asking questions about Biology” Lab equipment Instructor handouts

	solve problems and answer questions 3.2.10D Identify and apply the technological design process to solve problems 3.7.10B Apply instruments and apparatus to examine a variety of objects and processes		Oral presentation ABC's of Biology Performance-based	

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Course Name:	Biology
Content:	Cellular Anatomy
Key Learning(s):	Cells and Cell Structure
Essential Question(s):	What is the fundamental structural unit of life? What organelles are common to plant and animal cells? How do Eukaryotic cells differ from Prokaryotic cells? What is the cell theory? What are the basic structures of a cell?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.3.10A	Explain the relationship between structure and function at the molecular and cellular levels	The students will understand and explain the cell theory and its importance. The students will relate the structure of the cell membrane and its role in maintaining homeostasis. The students will acquire a working relationship of cellular anatomy.	Notebook Class participation Test: Cytology Word Splash	Textbook Cell drawing Lab materials Lab slides
3.3.10B	Explain cell functions and processes in terms of chemical reactions and energy changes	The students will determine the effects of variation to basic life functions. The students will compare prokaryotic cells and Eukaryotic cells. The students will describe the structure and functions of cell organelles.	Model Identification ABC's of Biology Mini Lab: Observing plant and animal cells Critical and creative thinking: relating parts and wholes	Compound light microscope CD-Rom Instructor Handouts Learning Activity "A tour of the Animal Cell"
3.3.10C	Describe and explain the chemical structural	The students will compare the structures of an animal and plant cell.	Lab: Inside plant and animals cells	Lab Manual: "Observing Cork Cells and Onion Cells"

3.3.10D	basis of living organisms Explain the structural and functional similarities and differences found among living things	The students will develop a basic understanding of the study of cells. The students will discuss selective permeability of cell membranes. The students will describe active and passive transport. The students will understand the effects of osmosis on cells. The students will explain the effects of osmosis and diffusion. The students will discuss the theory of evolution and creationism in helping to understand the origin of the 1st cell. The students will discuss selective permeability of cell membranes. The students will describe active and passive transport. The students will understand the effects of osmosis and cells.	Lab practical Lab report Drawing cells: Identify organelles Skills Development	Enrichment Activity "How plant and animal cells differ"

Northern York County School District Curriculum

Course Name:	Biology
Content:	Basic Chemistry
Key Learning(s):	The Atomic Theory of Matter, Chemical Bonding and Chemical Reactions
Essential Question(s):	What are Atoms, Elements and Compounds? How do we balance chemical reactions? Why are Covalent and Ionic Bonds Important?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.4.10A 3.3.10B	Explain concepts about the structure and properties of matter Describe and explain the chemical and structural basis of living organisms	The students will learn to explain the structure of an atom. The students will learn to describe that atoms are composed of sub-atomic structures whose properties are measurable. The students will develop a basic understanding of chemicals and their basic properties. The students will learn to balance chemical equations. The students will learn to identify chemical elements found in living things. The students will learn to explain the formation of covalent and ionic bonds. The students will learn to identify reactants and products in chemical equations. The students will develop a working definition of matter. The students will define and compare acids and bases and give examples of each. The students will define molecule, ion and chemical formula providing an example with each.	Class discussion Lab work Written quiz Whiteboard demonstration Groupwork: evaluating chemical equations Critical and creative thinking Performance-based	Textbook Lab equipment Enrichment Activity Discovery Learning CD-Rom: Atoms CD-Rom: Bonding Instructor Handouts Mini Lab: “Chemical Bonding”

Northern York County School District Curriculum

Course Name:	Biology
Content:	Chemistry of Living Things
Key Learning(s):	Organic and Inorganic Compounds
Essential Question(s):	What are the variety of organic compounds that make up living things? Why is carbon so important in Biological molecules? How are organic molecules synthesized? What are Carbohydrates? What are Lipids? What are Proteins? Why are enzymes important to cell chemistry?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.4.10A	Explain concepts about the structure and properties of matter	The students will learn to distinguish between organic and inorganic compounds. The students will learn to explain differences and similarities of the four major types of organic compounds found in living cells.	Skills development: Synthesis of organic compounds Lab(s): Building molecular models	Instruction handouts Textbook CD-Rom: DNA-The Molecule of Life
3.3.10B	Describe and explain the chemical and structural basis of living organisms	The students will explain why organic compounds are larger and more complex than inorganic compounds. The students will explain the relationship between dehydration synthesis and hydrolysis. The students will describe the basic chemical make up of carbohydrates, fats, proteins, and nucleic acids.	Performance-based Class participation Drawing organic compounds Written test objective	CD-Rom: Enzymes Molecular Model Kits Lab materials Flashcards
3.3.10A	Explain the structural and functional similarities and differences	The students will describe how fat is formed by dehydration synthesis.	Completion of exercises and problems Notebook	Lab manual

	found among living things	The students will explain the relationship between saturated and unsaturated fat.	Chapter review	
3.2.10A	Apply knowledge and understanding about the nature of scientific and technological knowledge	The students will learn to compare the structures of DNA and RNA. The students will describe where the two types of nucleic acids are found and give the functions of these acids. The students will illustrate the general molecular structure of an amino acid.	Enrichment Activity: Dehydration Synthesis and Hydrolysis Lab practical using Molecular Model Kits Skills Application ABC's of Biology	
3.1.10B	Describe concepts of models as a way to predict and understand science and technology	The students will learn to distinguish between a polypeptide and a protein.	Word Splash	

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Course Name:	Biology
Content:	Cellular Respiration
Key Learning(s):	The uses of energy and the mechanism by which energy is used during cellular respiration
Essential Question(s):	Why is energy important for living things? What is the role of ATP during energy transfer? What are the chemical pathways involved with aerobic and anaerobic respiration? Why must oxidation-reduction reactions be coupled?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.3.10B 3.3.10C	Describe the relationship between the structure of organic molecules and the function they serve in living organisms Explain cell processes in terms of chemical reactions and energy changes	The students will learn to describe how living things use energy to carry out life functions. The students will distinguish between aerobic and anaerobic respiration. The students will predict which sugar will produce the fastest respiration in yeast. The students will discuss the function of electron carriers in cell respiration. The students will learn to explain the rule of ATP and hydrogen acceptors in energy transfers. The students will determine why cell respiration is important to living things. The students will learn to describe the overall scheme of glycolsis. The students will explain the process of fermentation. The students will learn the Krebs Cycle.	Chapter review Chapter objective test Busy Bee Competion ABC's of Biology Notebook Compare/Contrast Maxtrix Word Splash Respiration- Goldfish Lab Class discussion Lab: Oxidation-Reduction	Textbook Instructor worksheet Lab materials Videotape: Chemical Pathways Discovery Learning Activity CD-Rom: Cellular Respiration Lab Manual – Yeast Respiration Flashcards

		The students will identify how the electron transport chain operates in an organism's body. The students will relate fatigue to oxygen debt. The students will understand the role of proteins and fats in respiration.	Whiteboard demonstration Oral presentation Performance-based	

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Course Name:	Biology
Content:	Plants
Key Learning(s):	Fruits, seeds and the Life Cycles of Plants
Essential Question(s):	How are plant bodies organized and how do plants grow? What are the tissues and cell types of plants? How do plants acquire nutrients? How do plants acquire water and transport water and minerals?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.3.10A	Explain the structural and functional similarities and differences found among living things	The students will describe the life cycle of a gymnosperm. The students will learn to draw a flower and label all parts. The students will learn to describe the formation of male and female gametes in flowering plants. The students will explain pollination and fertilization in flowering plants. The students will compare different plane life cycles. The students will discuss fruits and seeds in flowering plants. The students will draw a diagram of the structure of a seed.	Notebook Class discussion Lab: "Seeds of flowering plants" Enrichment activity: Variations in pollen grains Chapter quiz Chapter review Section review Labwork: "Plant Life Cycles"	Study Guide Textbook Lab materials Instructor handouts Discovery Learning activity "Monocot and Dicots" Transparencies Mini Lab: "Flower Structure" CD-Rom Worksheet

		The students will learn to describe several mechanisms for seed dispersal. The students will learn root systems. The students will discuss leaves and stems The students will understand how cohesion and bulk flow is achieved.	Oral (group) presentations Word Splash	

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Course Name:	Biology
Content:	Classification of Living Things
Key Learning(s):	Taxonomy and the diversity of life
Essential Question(s):	Why are classification systems important? What are the six kingdoms all live things may be classified into? What is the naming system used in modern biology? What are the relationships between groups of organisms?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.3.10A 3.3.10A 3.3.10A	Identify and characterize major life forms to their placement in existing classification groups Describe organizing schemes of classification keys Identify and characterize major life forms by kingdom,, phyla, class and order	The students will name the six kingdoms and describe the characteristics of each. The students will learn binomial nomenclature and apply it to the modern classification system. The students will demonstrate knowledge of the modern classification system. The students will learn to describe the types of evidence now used to determine relationships between groups of organisms. The students will identify six kingdoms and describe the characteristics of each. The students will learn how the theory of evolution has affected taxonomy.	Section Review Chapter Test Lab Investigation: "Classifying organisms" Naming organisms lab Class discussion Instructor handouts Notebook Lab: Classifying Leaves Field Investigation Oral presentation Performance-based	Lab equipment Worksheets Textbooks Phylogenic Tree Learning Activity: Sorting the Animals Mini Lab: A Taxing Situation Transparencies Lab manual

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Course Name:	Biology
Content:	Homeostasis and the Organization of the Animal Body
Key Learning(s):	Human System Anatomy and Physiology
Essential Question(s):	How is the animal body organized? What is anatomy and physiology? How do animals maintain internal constancy? What is the relationship between structure and function? What are the principal systems of the human body, what are the composed of and how do they function?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.3.10A	Explain the structural and functional similarities and differences found among living things	The students will learn to identify the major structures and functions of the human body and their role in the maintenance of homeostasis. The students will develop an understanding of the interrelationship between the systems of the human body. The students will learn to describe the structure and function of the major organs of the human body. The students will learn to understand that humans are not unique in their performance of the functions necessary to maintain life.	Discussions Written chapter test Section review Notebook Word Splash Class drawing (each system) Group work Lab dissections Skills development Compare/contrast matrix Oral presentation	Textbook Lab materials Study guide Instructor handouts Discovery learning activity Mini Labs: Nutrition, Transport, Blood/Immunity, Gas Exchange, Excretion, Locomotion, nervous regulation, chemical regulation Learning Activity CD-Roms Worksheets Flashcards

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Course Name:	Biology
Content:	Animal Reproduction and Development
Key Learning(s):	Mitosis, Meiosis and Developmental Biology
Essential Question(s):	What are the two types of Reproduction? How does the Human Reproductive System work? What is Embryonic Development? What are the two basic processes involved in cell division? What role do hormones play during the menstrual cycle?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.3.10C 3.3.10C	Describe how genetic information is inherited and expressed Distinguish different reproductive patterns in living things	The students will learn to compare and contrast the function of mitosis and meiosis. The students will explain what happens during each stage of mitosis. The students will learn to compare the processes of asexual and sexual reproduction. The students will explain the process of cytokinesis. The students will describe the process of binary fission, budding and regeneration. The students will explain the importance of meiosis. The students will understand haploid and diploid cells. The students will state the advantages of sexual reproduction.	Lab Report Word Splash Objective Test Test-Writing Sample Chapter Quiz ABC's of Biology Completion of diagrams Skills development Section Reviews Chapter Reviews	Textbook Lab Manual Mini Lab: "Mitosis and Meosis" "Changing Hormone Levels" Videotape: "Miracle of Life" Instructor Handouts Transparencies CD-Rom Lab Materials Flashcards

		The students will explain conjugation in organisms. The students will compare oogenesis with spermatogenesis. The students will illustrate the relationship between eggs, methods of fertilization and stages of embryonic development. The students will describe the development of plant and animal embryos. The students will explain the hormonal interactions in the human male and female reproductive systems. The students will compare fraternal twins with identical twins. The students will learn the Anatomical and Functional structures of the human male and female reproductive systems.	Notebook Oral Presentation and explanation Learning Activity – "Regeneration" Critical and creative thinking skills Enrichment Activity	Mitosis Models Meiosis Models Videotape: "Life's Greatest Miracle"

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Course Name:	Biology
Content:	Genetics
Key Learning(s):	Mendelian, Modern and Applied Genetics
Essential Question(s):	What is the structure of DNA? How do we solve genetics problems? How is genetic information passed from one generation to the next? Why is the study of Heredity important?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.3.12C 3.1.12C 3.1.12D 3.1.12C	Explain gene inheritance and expression at the molecular level Assess and apply patterns Analyze and apply measurement scales when collecting data Assess patterns in nature using mathematical formulas	The students will learn to use the rules of probability to solve genetics problems. The students will explain Mendel's Laws in terms of meiosis and chromosomes. The students will use punnett squares to work out possible genetics results. The students will state the rules of inheritance that form the basis of Mendelian Genetics. The Students will learn to correlate patterns of inheritance. The students will state the roles of X are Y chromosomes in determining gender. The students will define linkage groups and crossing over.	Problem Solving Worksheets Probability Lab ABC's of Biology Notebook Oral presentation and explanation Performance-based Assessment Test-Solving problems Class participation Group presentation	Study Guide Lab Materials Instructor Handouts Discovery Learning Activity CD-Roms Textbook Enrichment Activity: "Probability in Genetics" Lab Equipment Genetics Model Board Transparencies

3.1.12E	Analyze how model systems have changes overtime	The students will learn to describe multiple gene inheritance. The students will complete sex-linked crosses. The students will learn to describe the three chemical parts of a DNA nucleotide. The students will list sources of Genetic Variation. The students will describe various genetic mutations. The students will compare genetic disorders.	Written objective test Critical and Creative thinking Skill application Chapter review Lab: "You and Your Genes" Lab: "Sex-Linked Crosses"	

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Course Name:	Biology
Content:	Ecology
Key Learning(s):	Human Ecology, Land Biomes and Organization in the Biosphere
Essential Question(s):	Where are the biomes of the earth and what role do they play in the organization of the biosphere? What are the interactions between organisms and their environment? Why is the flow of energy and continual cycling of materials important to the ecosystem? What is symbiosis? How do ecosystems work? How is life on land distributed?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
4.6.10A 4.6.40A 4.6.10A	Explain the significance of diversity in ecosystems Explain energy flow in a food chain Explain the biotic and the a biotic components of an ecosystem and their interaction	The students will compare the interdependency of organisms and their environment. The students will describe the feeding relationships in an ecosystem in terms of food chains and food webs. The students will learn the abiotic factors in the environment. The students will describe how light, temperature, and precipitation varies with position on the earth's surface. The students will compare the interdependency of organisms and their environment. The students will list symbiotic relationships in an ecosystem in terms of food chains and food webs.	Chapter objective test Test provide a writing sample Section review Chapter review Group work Completion of exercises and problems Worksheets "The Biosphere" Lab Report Performance-Based	Lab materials Textbook Instructor handouts CD-Rom: Making a mini habitat Videotape: "Observing a Food Chain" Learning activities CD-Rom: Food chains and food webs Videotapes: "The Nitrogen Cycle"

4.6.10A 4.6.10B 4.6.10C 4.7.10A	Identify the major biomes and explain their similarities and differences Explain how cycles affect the balance in an ecosystem Analyze how ecosystems change over time Explain the significance of diversity in ecosystems	The students will develop a basic understanding of the components that form and maintain an ecosystem. The students will critique human influence on the balance of nature. The students will explain the role that specific organisms have in their ecosystem. The students will compare adaptations among species. The students will describe the flow of energy in ecosystems referencing pyramids of energy and biomass. The students will discuss biogeochemical cycles. The students will develop an understanding of succession. The students will review all types of biomes. The students will discuss Human Ecology.	Graphic organizing flow chart Critical and creative thinking Oral presentation Skills application Notebook ABC's of biology Lab work Class discussion	"Ecological Succession" Mini Labs – Living Environment Circles of Materials Changes in Ecosystems Enrichment Activity Discovery Learning Flashcards

Northern York County School District Curriculum

Course Name:	Biology
Content:	Biology Laboratory
Key Learning(s):	Critical and Creative thinking skills while utilizing Micro techniques
Essential Question(s):	What are the basic analytical and technological skills biologists should know how to utilize?
Grade Level:	10th

Number	Standard	Student Learning Experiences	Procedures for Assessment	Resources
3.7.10A 3.7.10B	Apply advanced tool and equipment to solve problems Apply approximate instruments to examine a variety of objects and processes	The students will acquire knowledge of lab safety procedures and use of equipment. The students will distinguish between controls and variables in an experiment. The students will identify parts of the compound light microscope and their functions and form. The students will develop microscope slide techniques. The students will develop the ability to use and read measurement instruments. The students will develop a basic understanding of the internal/external anatomical structure of plants and animals. The students will develop on understanding in graphic organization. The students will use molecular model kits to construct molecules and compounds. The students will create drawings illustrating key concepts. The students will emphasize key concepts through anatomical and physiological lab work.	Lab practical Lab drawings Oral presentation Microscope demonstration and study Performance-based Notebook Handouts Demonstration and supervised dissection of lab specimens Data collection Flashcards	Lab manual Lab materials and equipment Textbook Mini labs Learning activities Supplemental texts CD-Roms Videotapes Flashcards Discovery learning