

Course:	Biology
Vocabulary Term / Unit	Definition
Bio.A.1 - Basic Biological Principles	Microbiology, Cell Anatomy, and the Characteristics of Life
cell theory	one of the most fundamental concepts of biology which states: 1.) All living things are composed of cells. 2.) Cells are the basic unit of structure and function in living things. and 3.) New cells are produced from existing cells.
cell wall	a rigid structure on the outside of some plasma membranes
centrioles	make spindle fiber in animal cells
chloroplast	membrane-bound organelle where glucose is made (photosynthesis)
cytoplasm	gel-like material inside cells
DNA	deoxyribonucleic acid; genetic material passed on from one generation to the next
Endoplasmic Reticulum (ER)	an organelle consisting of folded membranous passages and sacs; produces, processes and transports materials in and out of cells
eukaryote	cells that have cytoplasm, a cell membrane, and a nucleus
Golgi apparatus	a membrane-bound organelle composed of stacks of membranous sacks that modify and aid in the transport of proteins to their intended destinations
hypothesis	a proposed, scientifically testable explanation for an observed phenomenon
law	a explanation of scientific phenomenon that is highly quantifiable and able to be validated throughout the universe
lipid bilayer	double-layered sheet that forms the core of nearly all cell membranes
lysogenic infection	viral infection in which a virus embeds its DNA into the DNA of the host cell and is replicated along with the host cell's DNA
lytic infection	viral infection in which a virus enters a cell, makes copies of itself, and causes the cell to burst
mitochondrion	membrane-bound organelle that releases energy (see respiration)
multicellular	made up of more than one cell
nuclear membrane	structure that surrounds the nucleus
nucleus	membrane-bound organelle which contains genetic material
organ	a group a tissues that work together to perform closely related functions
organ system	a group of organs that work together to perform a specific function
organelle	specialized structure that performs important cellular functions in cells
organism	an individual living thing composed of one or more cells
pathogen	a disease-causing agent
plasma membrane (cell membrane)	a thin flexible layer around cells that makes the border between the cell and the outside environment
prion	protein particles that can cause disease
prokaryotes	bacteria and archaea; first form of life on earth based on fossil evidence
retrovirus	a virus that contains RNA as its genetic information rather than DNA
ribosomes	the organelle where proteins are made
rough endoplasmic reticulum (rER)	a membrane-bound organelle that transports proteins
science	evidence-based knowledge of the universe base on observation and experimentation
species	a group of organisms that are capable of interbreeding to produce fertile offspring
stroma	the space inside chloroplasts that lies between the outer membrane and the thylakoids
subatomic particle	one of the three component particles of atoms: protons, neutrons, and electrons
theory	a widely accepted explanation of observable phenomena based on observation, measurement, and logic
thylakoid	saclike photosynthetic membranes found inside chloroplasts
tissue	a group of similar cells that perform a particular function
unicellular	made up of a single cell
vacuole	membrane-bound organelle that stores water and nutrients
vesicle	a membrane-bound sac that is used to transport materials inside of a cell

Bio.A.2 - The Chemical Basis for Life	Biochemistry and the Properties of Water
antibody	proteins that fight foreign molecules (antigens)
atom	the basic unit of matter
base	any compound that forms hydroxide ions (OH ⁻) in solution
biological macromolecules	a group of biomacromolecules that interact with biological systems and their environments
buffer	weak acids or bases that can react with strong acids or bases to prevent sharp, sudden changes in pH
calorie	the amount of energy needed to raise the temperature of 1 gram of water 1° C
carbohydrate	compounds made up of carbon, hydrogen, and oxygen atoms usually in a ration of 1:2:1
catalyst	a substance that speeds up the rate of a chemical reaction
chemical formula	notation that shows the how many and which atoms are in a compound
chemical reaction	a process that changes one set of chemicals into another set of chemicals
cohesion	an attraction between molecules of the same substance
compound	a substance formed by the chemical combination of two or more elements in definite proportions
concentration	the mass of solute in a given volume of solution, or mass/volume
covalent bond	chemical bond that is formed when electrons are shared between elements
double helix	shape of DNA; like a twisted ladder
electron	a negatively charged subatomic particle with the mass of 1/1840th the mass of a proton
enzyme	a protein that acts as a biological catalyst
freezing point	a temperature at which a liquid changes state and becomes a solid
guanine	a base in DNA and RNA; represented by the letter G
hydrogen bonds	type of bonds that hold complementary base pairs together
ion	positively or negatively charged atoms
ionic bond	a chemical bond that forms when one or more electrons are transferred from one atom to another
isomer	molecules that have the same chemical formula but different structure
isotope	atoms of the same element that differ only in the number of neutrons they contain
lipid	biological polymers made mostly of carbon and hydrogen atoms
macromolecule	a polymer with a high molecular mass
mixture	a material that is composed of two or more elements or compounds that are physically mixed together but not chemically combined
molecule	the smallest unit of most compounds consisting of atoms bonded together
monomer	the smallest unit of molecules that make up polymers
monosaccharide	a simple sugar—the monomer of a carbohydrate
nucleic acid	macromolecules made of hydrogen, oxygen, nitrogen, carbon, and phosphorus
nucleotide	the monomer of a nucleic acid consisting of a sugar molecule, a phosphate, and a base
organic molecule	a molecule that contains the element carbon an is a part of or produced by a living system
peptide bond	bond between two amino acids
pH scale	a scale that ranges from 0 to 14 and measures the acidity or alkalinity of a solution
phosphate	a functional group containing phosphorus and oxygen
polymer	large molecules that are made from many smaller, repeating molecules called monomers
polysaccharide	carbohydrate polymers made by making chains of monosaccharides
product	the elements or compounds that are produced by a chemical reaction
protein	a macromolecule made up of amino acids
reactant	the elements or compounds that enter into a chemical reaction
ribonucleic acid	one of the major types of nucleic acids that contains the sugar ribose
ribose	the sugar found in RNA
solute	the substance in a solution that is dissolved
solution	a mixture in which all of the components are evenly distributed throughout
solvent	the substance in a solution that dissolves the solute
specific heat	the measure of the amount of heat needed to raise the temperature of a given amount of a substance to a certain level
structural formula	notation that shows the physical arrangement of atoms in a compound.
substrate	the reactant of an enzyme-catalyzed reaction
suspension	a mixture of water and undissolved material
synthesis	the combination of parts or elements so as to form a larger structure or compound
temperature	a measure of the average kinetic energy in the particles that make up a sample of matter
thymine	a base in DNA (not RNA); represented by the letter T

Bio.A.3 - Bioenergetics	Carbon Cycle, Basic Photosynthesis and Respiration
autotroph	an organism that can capture energy from sunlight or chemicals to produce food
biochemical conversion	the changing of organic matter into other forms
bipedal	walking on two legs
Calvin cycle	a set of reactions in photosynthesis that produces high-energy sugars
cellular respiration	a series of energy-transforming chemical reactions in cells that convert the chemical energy in food molecules to chemical energy of ATP molecules
chemoautotroph	prokaryotes that obtain energy directly from inorganic molecules
chemosynthesis	biological process that harnesses the potential energy of chemicals to produce energy rich carbohydrates
chlorophyll	chief pigment of photosynthesis
electron transport chain	the third and final stage of aerobic cellular respiration where electron carriers are used to generate ATP
fermentation	chemical breakdown of food molecules that occurs in environments where oxygen is not available
glycolysis	stage of aerobic and anaerobic respiration where glucose is broken down to produce ATP and electron carriers
Krebs cycle	the second stage of food breakdown in aerobic respiration where ATP and electron carriers are generated
light-dependent reactions	a set of reactions in photosynthesis that use light energy to produce ATP and NADPH and oxygen
NAD+	electron carrier molecule used in respiration
NADP+	electron carrier molecule used in photosynthesis
photosynthesis	biological process that harnesses the energy of sunlight to convert water and carbon dioxide into energy rich glucose
pigment	light absorbing molecules
plastids	a group of membrane-bound organelles commonly found in photosynthetic organisms and mainly responsible for the synthesis and storage of food
producer	an organism that can capture energy from sunlight or chemicals to produce food

Bio.A.4 - Homeostasis and Transport	Homeostatic mechanisms, Cell Membrane, Membrane Transport
carrier (transport) proteins	proteins embedded in the plasma membrane that move larger materials into and out of the cell
concentration gradient	the gradual difference in concentration of a solute per unit distance through a solution
extracellular	located outside of a cell
homeostasis	process by which an organism maintains a relatively stable internal environment
homeostatic mechanisms	a regulatory mechanism that contributes to maintaining a state of equilibrium
impermeable	not permitting passage of a substance or substances
intracellular	located inside of a cell
membrane	lipid bilayer that acts as a border for cells and organelles
osmosis	diffusion of water through a selective permeable membrane
passive transport	the transport of materials across the plasma membrane without the need of energy
phagocytosis	process in which extensions of the cytoplasm surround and engulf large particles and take them into the cell
pumps (ion or molecular)	a molecular mechanism that transports ions or molecules across the plasma membrane
selective permeability	property of biological membranes that allows only certain substances to pass through them

Bio.B.1 - Cell Growth and Reproduction	DNA Structure and Replication, Mitosis, and Meiosis
asexual reproduction	reproduction that requires only one parent and no sex; offspring are clones of the parent
ATP synthase	protein in the thylakoid that uses the energy of flowing H ⁺ to produce ATP
cancer	excessive cell division where damaged cells divide and spread
cell cycle	the series of events involved in the life and division of a cell
chromatids	sister pieces (identical copies) of DNA that make up a duplicated chromosome
chromosome	long strand of DNA that contains thousands of genes; humans have 46 chromosomes
cleavage	the indentation that forms during cytokinesis in animal cells
crossing over	when sections of homologous chromosomes are exchanged in prophase 1 of meiosis
cytokinesis	division of cytoplasm; formation of cleavage
cytosine	a base in DNA and RNA; represented by the letter C
deoxyribonucleic acid	one of the major types of nucleic acids that contains the sugar deoxyribose
deoxyribose	the sugar in DNA
diploid	total number of chromosomes; 46 for normal humans
DNA polymerase	the enzyme that copies DNA
DNA replication	the process by which DNA makes a copy of itself
egg	female sex cell
fertilization	the fusing of an sperm with an egg, which combines mother and father DNA to make a baby
gametes	sex cells
interphase	phase when cells do their normal jobs; cell prepares for division by DNA replicating
James Watson and Francis Crick	the men who first correctly described the structure of DNA in 1953
meiosis	when a cell divides to make four sex cells that have half the number of chromosomes as the original cell
metaphase	chromosomes line up in the middle of the cell with spindle attached to them
mitosis	when a cell divides to make two identical cells that are the same as the original cell
ovaries	female sex organ that produces eggs
point mutations	a mutation that affects only one nucleotide
prophase	first phase of mitosis; cell breaks down nucleus to prepare for chromosomes to move, spindle fibers form and centrioles separate
RNA	ribonucleic acid; the genetic material made from DNA
RNA polymerase	the enzyme that uses DNA to make RNA
semiconservative replication	DNA replication that results in each molecule of a copied DNA molecule possessing one of the original strands of DNA
sexual reproduction	reproduction that requires two parents and sex to make offspring that are a genetic mixture of the two parents
somatic cells	body cells (compare to gametes)
spindle fiber	rope-like fibers that move chromosomes during division
telophase	two new nuclei form around each set of chromatids at each end of the cell; cytokinesis begins
testes	male sex organ that produces sperm
uracil	a base in RNA (not DNA); represented by the letter U

Bio.B.2 - Genetics	Transcription and Translation, Genetics, and Biotechnology
allele frequency	a measure of the proportion or percentage of the population that has a certain allele
biotechnology	the application of biological systems or living organisms to develop or modify either products or processes for specific use.
chromosomal mutation	a change in the structure of a chromosome that could affect its function
forensics	the science of tests and techniques used during the investigation of crimes
frameshift mutation	a mutation that involves either inserting or deleting nucleotides (not in multiples of 3) where the reading frame of the gene shifts
gel electrophoresis	a procedure that separates DNA fragments based on their size
gene	a section of DNA that gives instructions for a protein to be made
gene expression	the process in which the coding portion of a gene is used to make a functional product such as a protein or RNA
gene recombination	a process in which a DNA or RNA molecule is broken and joined to another DNA or RNA molecule
gene regulation	turning off or turning on genes
gene splicing	a type of gene recombination in which DNA is intentionally broken and recombined using lab techniques
gene therapy	the intentional alteration of genes within a person's cells for the purpose of treating a disease
genetic engineering	making changes in the DNA code of organisms
genetically modified organism	an organism whose genetic material has been altered through genetic engineering
genetics	the study of inheritance
genotype	the type of genes an organism has for a trait
Gregor Mendel	father of genetics
haploid	number of pairs of chromosomes; half the total number; 23 for normal humans
heredity	the passing on of genetic information from one generation to the next
heterozygous	two alleles for a trait are different; hybrid
homozygous	two alleles for a trait are the same; pure
incomplete dominance	one allele is not completely dominant over another allele
independent assortment	homologous chromosomes separate independently from one another during meiosis
inheritance	the process in which genetic material is passed from parents to their offspring
introns	sections of mRNA that are removed prior to translation
karyotype	picture of chromosomes used to determine if there is a chromosomal problem
mRNA	the RNA that carries the code to make a protein
multiple alleles	more than two forms of a gene controlling the expression of a trait
mutagen	an agent that causes DNA to mutate
mutation	changes in DNA sequences
nondisjunction	an error in meiosis where homologous chromosomes fail to separate
P generation	the original parent generation
pedigree	a family tree used to predict genotypes of family members and trace genes through family
phenotype	the physical trait of an organism
polygenic trait	a trait in which the phenotype is controlled by two or more genes
principle	a concept based on scientific laws
protein synthesis	the process that produces a chain of amino acids from a linear sequence of nucleotides
recessive trait	both alleles needed to express the trait; represented by a lower case letter
restriction enzymes	enzymes that cut DNA at particular nucleotide sequences
sex-linked recessive disorders	caused by recessive gene on a sex chromosome; ex. hemophilia, adrenoleukodystrophy, colorblindness
sex-linked trait	alleles are on the sex chromosomes
transcription	the process of using DNA to make RNA
transgenic organism	organisms that are artificially given genes from other organisms
translation	the process of using mRNA to make proteins
translocation	the process in which a segment of a chromosome breaks off and is attached to another chromosome
tRNA	carries amino acids to ribosome during translation

Bio.B.3 - Evolution	Evolution
analogous structures	a body structure in organisms that has a similar function, but different structural and genetic characteristics
embryology	the branch of zoology studying the early development of living things
endosymbiosis	a theorized process in which early eukaryotes were formed by incorporating prokaryotes into their cytoplasm
fossils	traces of organisms that lived long ago
founder effect	a decrease in genetic variation caused by the formation of a new population by a small number of individuals from a larger population
gene frequency	the proportion of a gene (allele) within a gene pool
gene pool	the sum of a population's genes
genetic drift	relatively rapid gene frequency changes in small, isolated populations
genetic isolation	genetic (DNA, gametes) barriers that prevent two species from mating
geographic isolation	physical land structures like mountains and lakes that prevent two species from mating
gradualism	a theory of evolutionary biology that states that new species arise through slight genetic modifications over many generations
hominids	primates that walk upright, have large brains, and opposable thumbs, and have only one living genus today
<i>Homo erectus</i>	hominid from 1.8 mya – 180,000 years ago, used fire, migrated from Africa,
<i>Homo habilis</i>	hominid appeared around 2.5 mya, used tools made from bones and stone
<i>Homo sapiens sapiens</i>	hominid from 100,000 years ago to present day, used tools, created art, and buried dead with rituals only surviving hominid species
homologous structures	a body structure in organisms that has a similar structure and genetic characteristics, but differs in its function.
isolating mechanisms	features or systems that will prevent mating between species or populations
migration (genetics)	the movement of genes into or out of a population that results in a change in allele frequency
natural selection	the environment favors certain traits and organisms with those traits are better able to survive and pass on such traits to their offspring; survival of the fittest
punctuated equilibrium	theory in evolutionary biology which describes populations as evolving in relatively rapid bursts followed by long periods of genetic stability
reproductive isolation	when two populations cannot interbreed and make fertile offspring
selective breeding	breeding organisms for specific genetic traits
speciation	the production of a new species
structural adaptation	an adaptation that is a physical part of an organism's body
temporal isolation	time of year barriers that prevent two species from mating
vestigial structure	structure that is present in current organisms that does not have a function and is thought to have once had a function in early ancestors of the current organism

Bio.B.4 - Ecology and Population Biology	Basic ecological principles and major concepts of population biology
agriculture	The artificial cultivation of food, fiber, and other goods by the systematic growing and harvesting of various organisms
aquatic	of or pertaining to the water
bioenergetics	the study of energy flow into and within living systems
biogeochemical cycles	the movement of abiotic factors between the living and nonliving components within ecosystems; also known as nutrient cycles
competition	when organisms struggle with one another for the same resources
demographic transition	a dramatic change in birth and death rates from historical high birth rates and high death rates to low birth rates and low death rates.
demography	the scientific study of human populations
denitrification	process that converts nitrates and nitrites back into nitrogen gas
density-dependent limiting factor	a limiting factor whose effect on a population fluctuates with changes in population density increases
density-independent limiting factor	a limiting factor whose effect on a population does not fluctuate with changes in population density increases
detritivore	a type of heterotroph that eats only plant and animal remains
detritus	tiny fragments of dead plant and animal material
ecological pyramid	a diagram that shows the relative amounts of energy or matter contained within each trophic level of a food chain or food web
ecological succession	the series of predictable changes that occur in a community over time
ecology	the scientific study of the interactions among and between organisms and their environment
ecosystem	a community combined with their non-living or physical environment
emigration	the movement of individuals out of an area
endemic species	a species that is found in its native location and is generally restricted to that geographic area
energy pyramid	a model that illustrates the biomass productivity at multiple trophic levels in a given ecosystem
energy transformation	a process in which energy changes from one form to another
environment	the total surroundings of an organism or a group of organisms
estuary	wetlands that form where rivers meet the sea
Eutrophication	the process by which a body of water becomes enriched in dissolved nutrients (as phosphates) that stimulate the growth of aquatic plant life usually resulting in the depletion of dissolved oxygen
exponential growth	very rapid population growth that occurs under ideal conditions
extinction	an event that occurs in a species that no longer has any living members on the planet
food web	the linking together of all of the food chains in an ecosystem
food chain	a series of steps in an ecosystem in which organisms transfer energy by eating and being eaten
habitat	the area in which an organism lives
herbivore	a type of heterotroph that eats only plants
heterotroph	organisms that cannot make their own food molecules and must rely on other organisms for food
immigration	the movement of individuals into an area
lentic ecosystem	standing water ecosystem
limiting factor	a factor that affects the growth of a population
limiting nutrient	a substance that limits the food web of an entire ecosystem because of its scarcity or slow cycling
logistic growth	population growth that is characterized by a period of exponential growth followed by a period of no growth
lotic ecosystem	flowing water ecosystem
mechanism	the combination of components and processes that serve a common function
microclimate	climate within a small area that differs significantly from the surrounding climate
mutualism	community interaction in which both species benefit from the interaction
niche	the full range of physical and biological conditions in which an organism lives and the way in which the organism uses those conditions in its environment
nitrogen fixation	process that converts nitrogen gas into ammonia
nonnative species	a species that did not evolve in the ecosystem into which it was introduced
nutrient	any substance that an organism requires to live
omnivore	a type of heterotroph that eats both autotrophs and heterotrophs
parasitism	community interaction in which one species benefits and the other is harmed by the interaction
pioneer species	the first species to populate an area.
population	a group of organisms belonging to the same species and living in the same area
population density	a measure of the number of individuals per unit area
population dynamics	a study of the short- and long-term changes in a population
predation	community interaction in which one organism captures and feeds on another organism
primary productivity	the rate at which organic matter is created by producers
primary succession	succession that occurs on land where there is no soil.
resource	any biotic or abiotic necessity of life
secondary succession	succession that occurs in an area where the existing community changes without removing the soil
symbiosis	any community interaction in which two species live closely together
system	a set of interacting components that form an integrated whole.
terrestrial	of or pertaining to the land
trophic level	each step of a food chain or food web
wetland	area where water covers the land or is present within 12 inches of the surface for at least part of the year and contains emergent plants that are tolerant of water saturated soil