This course offers an introduction to the science of life and its interactions. This course of study includes the central themes of cell biology, biochemistry, genetics, taxonomy, comparative anatomy, physiology, evolution and ecology through inquiry-based instruction. Lab participation is a major component of this course with an emphasis on the development of the student's analytical skills in both the acquisition and evaluation of qualitative and quantitative data. Students engage in investigations to understand and explain the behavior of living things in a variety of scenarios that incorporate scientific reasoning, analysis, communication skills, and real-world applications.

This course meets the graduation requirements of a Life Science. Upon completion of this course, students will complete the end of course exam for Biology.

Science Inquiry and Application Standards

During the years of grades 9 through 12 all students must use the following scientific processes with appropriate laboratory safety techniques to construct their knowledge and understanding in all science content areas. These are ongoing skills that will be developed and intertwined within the content of the course.

- Identify questions and concepts that guide scientific investigations
- Design and conduct scientific investigations
- Use technology and mathematics to improve investigations and communications
- Formulate and revise explanations and models using logic and evidence (critical thinking)
- Recognize and analyze explanations and models
- Communicate and support a scientific argument
English Language Arts Standards for Science & Technical Subjects

I Key Ideas and Details
   A Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
   B Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
   C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

II Craft and Structure
   A Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
   B Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
   C Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

III Integration of Knowledge and Ideas
   A Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
   B Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem.
   C Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

IV Range of Reading and Level of Text Complexity
   A By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
Writing Standards for Literacy in Science & Technical Subjects

I  Text Types and Purposes Standard 1
   A  Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.
   B  Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience’s knowledge level and concerns.
   C  Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
   D  Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
   E  Provide a concluding statement or section that follows from or supports the argument presented.

II  Text Types and Purposes Standard 2
   A  Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
   B  Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.
   C  Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.
   D  Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
   E  Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
   F  Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).
III Production and Distribution of Writing
   A  Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
   B  Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
   C  Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology’s capacity to link to other information and to display information flexibly and dynamically.

IV Research to Build and Present Knowledge
   A  Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
   B  Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
   C  Draw evidence from informational texts to support analysis, reflection, and research.

V Range of Writing
   A  Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Content Standards

I Heredity

A Cellular Genetics

1. Recognize that scientific knowledge and explanations have changed over time, almost always building on earlier knowledge.
2. Describe the structure and function of chromosomes.
3. Compare eukaryotic to prokaryotic chromosomes.
4. Explain the difference between sex chromosomes and autosomes.
5. Describe the phases of mitosis and accompanying cell division which produce diploid cells.
6. Identify, using sketches and models, the distinct stages of mitosis.
7. Compare and contrast the processes of cell division and nuclear division.
8. Identify those cell structures contributing to mitotic activity.
10. Describe the phases of meiosis and accompanying cell divisions which produce haploid cells.
11. Identify those cell structures contributing to meiotic activity.
12. Identify, using sketches and models, the distinct stages of meiosis.
14. Identify those factors which control mitotic and meiotic processes.
15. Describe methods of asexual reproduction.
16. Describe the cellular activities of sexual reproduction.
17. Describe the chromosomal activities of sexual reproduction.
18. Discuss the importance of sexual reproduction and genetic diversity.

B Structure and Function of DNA in Cells

1. Illustrate the relationship of the structure and function of DNA to protein synthesis and the characteristics of an organism.
2. Cite the research contributions of specific scientists in the discovery and functions of nucleic acids.
3. Define the role of nucleic acids in cell biochemistry.
4. Compare and contrast the structure of DNA and RNA.
5. Compare and contrast the function of DNA and RNA.
6. Identify the general structure of a nucleotide.
7. Describe the process of DNA synthesis (replication).
8. Describe the process of RNA synthesis (transcription).
9. Describe the process of protein synthesis (translation).
10 Explain the concept of base pair complementarity.
11 Identify the role of ribosomes in protein synthesis.
12 Cite the roles of protein in cell anatomy and physiology.
13 Discuss the importance of protein synthesis in terms of protein structure.

C Genetic Mechanisms and Inheritance

1 Explain that a unit of hereditary information is called a gene, and genes may occur in different forms called alleles (e.g., gene for pea plant height has two alleles, tall and short)
2 Use the concepts of Mendelian and non-Mendelian genetics (e.g., segregation, independent assortment, dominant and recessive traits, sex-linked traits) to explain inheritance.
3 Use mathematical models to predict and analyze potential genetic outcomes.
4 Describe historical scientific developments that occurred in evolutionary thought (e.g., Lamarck and Darwin, Mendelian Genetics and modern synthesis).
5 Identify Mendel's contributions to the science of genetics.
6 State and explain the concept of unit characters (aka genes, aka factors).
7 State and explain the principle of dominance and recessiveness.
8 State and explain the principle of segregation.
9 State and explain the principle of independent assortment.
10 Explain the relationship between an organism's genotype and phenotype.
11 Demonstrate the use of the Punnett square in solving of genetics problems.
12 Describe those conditions under which the classic Mendelian ratios will be demonstrated.
13 Calculate, using the laws of probability, the expected outcomes of specific genetic crosses.
14 Capably solve selected/assigned genetics problems (mono- and dihybrid).

D Mutations

1 Describe that spontaneous changes in DNA are mutations, which are a source of genetic variation. When mutations occur in sex cells, they may be passed on to future generations; mutations that occur in body cells may affect the functioning of that cell or the organism in which that cell is found.
2 Modern Genetics
3 Analyze and investigate emerging scientific issues (e.g., genetically modified food, stem cell research, genetic research, cloning).
4 Describe Sutton and Boveri's chromosome theory.
5 Distinguish between sex chromosomes and autosomes.
6 Describe sex determination in terms of chromosomal inheritance.
7 Explain the concept of sex-linked traits.
8 Present specific examples of linked traits in fruit fly and human species.
9 Identify specific causes of gene and chromosomal mutation.
10 Identify specific human chromosomal disorders and their causes.
11 Identify specific examples of gene mutations and their effects on the organism and offspring.
12 Calculate the outcomes and probabilities of specific genetics problems.
13 Produce and analyze pedigree charts; use the information from such a chart to calculate genetic probabilities.
14 Describe several methods used to detect and treat genetic disorders either pre-natally or post-natally.
15 Construct and identify an unknown karyotype.

II Mechanisms of Evolution

A Natural Selection

1 Recognize that a change in gene frequency (genetic composition) in a population over time is a foundation of biological evolution.
2 Explain that the variation of organisms within a species increases the likelihood that at least some members of a species will survive under gradually changing environmental conditions.
3 Explain that natural selection provides the following mechanism for evolution; undirected variation in inherited characteristics exist within every species. These characteristics may give individuals an advantage or disadvantage compared to others in surviving and reproducing. The advantaged offspring are more likely to survive and reproduce. Therefore, the proportion of individuals that have advantageous characteristics will increase. When an environment changes, the survival value of some inherited characteristics may change.
4 Relate diversity and adaptation to structures and their functions in living organisms (e.g., adaptive radiation).
5 Recognize that a change in gene frequency (genetic composition) in a population over time is a foundation of biological evolution.
B Mutations

1. Describe that spontaneous changes in DNA are mutations, which are a source of genetic variation. When mutations occur in sex cells, they may be passed on to future generations; mutations that occur in body cells may affect the functioning of that cell or the organism in which that cell is found.

2. Illustrate the relationship of the structure and function of DNA to protein synthesis and the characteristics of an organism.

C Genetic Drift

1. Analyze how natural selection and other evolutionary mechanisms (e.g. genetic drift, immigration, emigration, mutation) and their consequences provide a scientific explanation for the diversity and unity of past life forms, as depicted in the fossil record, and present life forms.

D Gene Flow (immigration, emigration)

1. Analyze how natural selection and other evolutionary mechanisms (e.g. genetic drift, immigration, emigration, mutation) and their consequences provide a scientific explanation for the diversity and unity of past life forms, as depicted in the fossil record, and present life forms.

E Sexual Selection

1. Describe the process of sexual selection citing specific examples from the animal kingdom and change the current.

F History of Life on Earth

1. Describe the current scientific evidence that supports the theory of the explosive expansion of the universe, the Big Bang, over 10 billion years ago.

2. Explain how geologic time can be estimated by multiple methods (e.g., rock sequences, fossil correlation, radiometric dating).

3. Describe how organisms on Earth contributed to the dramatic change in oxygen content of Earth’s early atmosphere.

4. Explain that life on Earth is thought to have begun as simple, one celled organisms approximately 4 billion years ago. During most of the history of Earth only single celled microorganisms existed, but once
cells with nuclei developed about a billion years ago, increasingly complex multicellular organisms evolved.

5 Summarize the results of select scientific investigations into the theory of spontaneous generation.

6 Outline the modern scientific understanding of the formation of Earth.

7 Describe those modern theories and research describing the prokaryotic origin of life on Earth.

8 Describe the modern theories and research regarding the eukaryotic origin of life on Earth.

9 Explain the process(es) by which fossils are preserved and analyzed.

10 Correlate specific incidents in the development of life on earth with geologic time periods.

11 Describe Lamarck's theory of evolution.

12 State and explain Darwin's theories of natural selection.

13 State and explain the biological evidence in support of evolutionary theories.

14 Describe the processes (natural selection, sexual selection) by which new species develop.

15 Compare and contrast various patterns of evolutionary development.

16 Model, through a lab exercise, the changes in gene frequencies within a population.

17 Distinguish between the concepts of gradualism and punctuated equilibrium.

III Evolution: Diversity of Life

A Speciation and biological classification based on molecular evidence

1 Identify the purpose of the biological science of taxonomy.

2 Identify and utilize the hierarchy of select taxonomic categories.

3 Describe the methods used by biologists to classify organism

4 Identify the specific taxons and characteristics of modern man.

5 Compare and contrast features of selected primates and hominids.

6 Cite and compare specific models of human evolution.

B Variation of organisms within a species due to population genetics and gene frequency (immigration, emigration)

IV Diversity and Interdependence of Life

A Classification systems are frameworks created by scientists for describing the vast diversity of organisms indicating the degree of relatedness between organisms.
1 Describe that biological classification represents how organisms are related with species being the most fundamental unit of the classification system. Relate how biologists arrange organisms into a hierarchy of groups and subgroups based on similarities and differences that reflect their evolutionary relationships.

B Ecosystems

1 Summarize the relationship between the climatic zone and the resultant biomes. (This includes explaining the nature of the rainfall and temperature of the mid-latitude climatic zone that supports the deciduous forest.)
2 Describe how matter cycles and energy flows through different levels of organization in living systems and between living systems and the physical environment. Explain how some energy is stored and much is dissipated into the environment as thermal energy (e.g., food webs and energy pyramids)
3 Explain how living organisms interact with biotic and abiotic components of the environment (e.g., predation, competition, natural disasters and weather).
4 Conclude that ecosystems tend to have cyclic fluctuations around a state of approximate equilibrium that can change when climate changes, when one or more new species appear as a result of immigration or when one or more species disappear.

C Homeostasis

1 Explain the characteristics of life as indicated by cellular processes including:
   (a) Homeostasis
   (b) Energy transfers and transformation
   (c) Transportation of molecules
   (d) Disposal of wastes
   (e) Synthesis of new molecules

D Carrying Capacity

1 Relate how distribution and abundance of organisms and populations in ecosystems are limited by the ability of the ecosystem to recycle materials and the availability of matter, space and energy.

E Equilibrium and disequilibrium
1. Explain how the acquisition and use of resources, urban growth and waste disposal can accelerate natural change and impact the quality of life.

2. Describe ways that human activity can alter biogeochemical cycles (e.g., carbon and nitrogen cycles) as well as food webs and energy pyramids (e.g., pest control, legume rotation crops vs. chemical fertilizers).

3. Describe ways that human activities can deliberately or inadvertently alter the equilibrium in ecosystems. Explain how changes in technology/biotechnology can cause significant changes, either positive or negative, in environmental quality and carrying capacity.

F Population

1. Illustrate how uses of resources at local, state, regional, national, and global levels have affected the quality of life (e.g., energy production, sustainable vs. nonsustainable agriculture).

2. Describe means of comparing the benefits with the risks of technology and how science can inform public policy.

3. Explain what sort of interactions exist in the biosphere.

4. Identify specific interactions between living things and their physical environment.

5. Identify and describe the major terrestrial and aquatic biomes.

6. Describe the nitrogen, carbon and water cycles.

7. Explain the function of trophic levels in an ecosystem.

8. Describe the food chains of an ecosystem.

9. Describe the three types of ecological pyramids.

10. Explain the process of succession in a pond and forest community.

11. Use math and graphing skills to model and interpret population changes involving various organisms and ecosystems.

V Cell Structure and Function

A Structure, function and interrelatedness of cell organelles

1. Compare the structure, function and interrelatedness of cell organelles in eukaryotic cells (e.g., nucleus, chromosome, mitochondria, cell membrane, cell wall, chloroplast, cilia, and flagella) and prokaryotic cells.

B Eukaryotic Cells and Prokaryotic Cells

1. Explain that living cells: Are composed of a small number of key elements (carbon, hydrogen, oxygen, nitrogen, phosphorus and sulfur), are the basic unit of structure and function of all living things, come
from pre-existing cells after life originated, and are different from viruses.
2 Identify the properties and physical characteristics of virus particles.
3 Describe the structure and chemical composition of viruses.
4 Explain and utilize a system of classifying viruses.
5 Describe the lytic and lysogenic cycles of viral activity.
6 Explain how viruses can cause cancer.
7 Identify genetically engineered virus particles as potential treatments for human genetic disorders.
8 Capably utilize a taxonomic system to classify bacteria.
9 Identify the structures of bacterial cells and their functions.
10 Distinguish among the various types of bacterial respiration.
11 Distinguish among the various types of bacterial nutrition.
12 Describe the ecological role of bacteria.
13 Identify those methods by which bacterial species reproduce.
14 Explain the two methods by which bacteria exchange genetic information.
15 Use proper lab techniques to investigate select cultures.
16 Describe the manners in which bacteria or viruses can cause disease.
17 Identify the cause and effects of specific microbial diseases.
18 Specify how antibiotics function.
19 Describe how antibiotic resistance has come about.
20 Cite examples of bacteria that are helpful to humans.
21 Utilize the 6K taxonomic system to classify organisms in this unit.
22 Explain the endosymbiotic theory of eukaryotic cells.
23 Describe the structures and characteristics of select species of protozoans.
24 Distinguish between prokaryotic and eukaryotic algal species.
25 Describe the characteristics of the algal protists.
26 List the general characteristics of the Fungi kingdom.
27 List the characteristics of the plant kingdom.
28 Identify the taxonomic divisions of the plant kingdom.
29 Describe the evolutionary development of plants.
30 Identify specific structures of select plant specimens.
31 List the distinguishing characteristics of the animal kingdom.
32 Identify the various types of body plans and symmetries found within the members of the animal kingdom.
33 Describe the general pattern of development of multicellular animals.
34 Describe the distinctive characteristics of select phyla.
35 Utilize a phylogenetic tree to describe the relative complexity and evolutionary pathways of animal phyla.
36 Utilize proper dissection and microscopic techniques in the examination and analysis of lab specimens.
37 List the three major chordate characteristics.
38 List the three subphyla of chordates, citing representative organisms in each group.
39 List the 9 classes of vertebrates, citing a representative organism in each group.
40 Describe the structural characteristics of vertebrates.
41 Describe the anatomy of the select vertebrates.

C Cellular Processes

1 Explain that living organisms use matter and energy to synthesize a variety of organic molecules (e.g., proteins, carbohydrates, lipids and nucleic acids) and drive life processes (e.g., growth, reacting to the environment, reproduction and movement).
2 Explain the characteristics of life as indicated by cellular processes including: homeostasis, energy transfers and transformation, transportation of molecules, disposal of wastes, synthesis of new molecules.

D Photosynthesis, Chemosynthesis, Cellular respiration

1 Describe how cells and organisms acquire and release energy (photosynthesis, chemosynthesis, cellular respiration and fermentation).
2 Demonstrate that electromagnetic radiation is a form of energy. Recognize that light acts as a wave. Show that visible light is a part of the electromagnetic spectrum (e.g., radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays).

E Cell Division and Differentiation

1 Summarize the general processes of cell division and differentiation, and explain why specialized cells are useful to organisms and explain that complex multicellular organisms are formed as highly organized arrangements of differentiated cells.
2 State and explain the cell theory.
3 Identify those scientists and research efforts which developed the cell theory.
4 Compare and contrast prokaryotic to eukaryotic cells.
5 Compare and contrast animal to plant cells.
6 Identify on a diagram or model specific structures of plant and animal cells.
7 Describe the functions of organelles found in plant and animal cells.
8 List the chemical compositions of cellular materials and organelles.
9 Identify basic cells and tissues found in animals.
10 Describe the levels of organization found in multicellular organisms.
11 As a lab practical, demonstrate the preparation of wet mount slides.
12 Properly draw and label specific cells and tissues upon examination of a prepared slide.
13 Describe the concept of diffusion; illustrate this concept with specific examples.
14 Describe the capabilities of membranes that are rated as permeable, (a) semipermeable and impermeable.
15 Describe the concept of osmosis and its relevance to living cells.
16 Evaluate how cells respond to isotonic, hypertonic and hypotonic environments.
17 Distinguish between turgor pressure, plasmolysis, and cytolysis.
18 Compare and contrast active and passive transport mechanisms in cells.
19 Explain the differences between endocytosis and exocytosis.
20 Compare and contrast pinocytosis to phagocytosis.
21 Explain the characteristics of light and the importance of light to photosynthesis.
22 Identify those wavelengths of light used in photosynthesis by green plants.
23 List those scientists and discoveries reviewed in the history of photosynthesis.
24 Describe the structure and function of chlorophyll.
25 Identify the nature and role of additional plant pigments.
26 Describe the structure and function of chloroplasts.
27 Describe the structure and functions of ADP and ATP.
28 Cite the chemical reactions of the light phase of photosynthesis, both PS I and PS II.
29 Cite the chemical reactions of the dark phase (Calvin cycle) of photosynthesis.
30 Describe the optimal conditions for photosynthesis.
31 Compare and contrast autotrophic to heterotrophic organisms.
32 Briefly describe alternative methods of photosynthesis, such as C3 paths and CAM.
33 Compare photosynthesis to chemosynthesis.
34 Describe the structure and function of mitochondria.
35 Describe the process of aerobic respiration with regard to organisms, conditions, and purpose.
36 Describe the chemistry of glycolysis; where it occurs, reactants, end products and importance to cells.
37 Explain the Kreb's cycle with regard to where it occurs, end products and importance to cells.
38 Explain the electron transport chain with regards to where it occurs, reactants, end products and purpose.
39 Cite the organisms, conditions and purpose of anaerobic respiration.
40 Compare and contrast alcoholic to lactic acid fermentation.
41 Describe those factors which affect anaerobic respiration in yeast cells.
42 Describe those factors which affect aerobic respiration in organisms.
43 Compare and contrast the processes of respiration and photosynthesis.
44 Identify, compare and contrast the structure and function(s) of ADP and ATP.

VI Chemical Biology

A Recognize that all atoms of the same element contain the same number of protons, and elements with the same number of protons may or may not have the same mass. Those with different masses (different numbers of neutrons) are called isotopes.

B Illustrate that atoms with the same number of positively charged protons and negatively charged electrons are electrically neutral.

C Describe radioactive substances as unstable nuclei that undergo random spontaneous nuclear decay emitting particles and/or high energy wavelike radiation.

D Show that when elements are listed in order according to the number of protons (called the atomic number), the repeating patterns of physical and chemical properties identify families of elements. Recognize that the periodic table was formed as a result of the repeating pattern of electron configurations.

E Describe how ions are formed when an atom or a group of atoms acquire an unbalanced change by gaining or losing one or more electrons.

F Explain that the electric force between the nucleus and the electrons hold an atom together. Relate that on a larger scale, electric forces hold solid and liquid materials together (e.g. salt crystals, water).

G Show how atoms may be bonded together by losing, gaining or sharing electrons and that in a chemical reaction, the number, type of atoms and total mass must be the same before and after the reaction (e.g., writing correct chemical formulas and writing balanced chemical equations).

H Demonstrate that the pH scale (0-14) is used to measure acidity and classify substances or solutions as acidic, basic, or neutral.

I Illustrate that chemical reactions are either endothermic or exothermic (e.g., cold packs, hot packs and the burning of fossil fuels).

J Trace the transformations of energy within a system (e.g., chemical potential to kinetic) and recognize that energy is conserved. Show that these transformations involve the release of some thermal energy.

K Show how atoms may be bonded together by losing, gaining or sharing electrons and that in a chemical reaction, the number, type of atoms and total mass must be the same before and after the reaction (e.g., writing correct chemical formulas and writing balanced chemical equations).

L Describe the basic forms of energy.

M Sketch atoms and molecules of specific elements using orbital diagrams.
N  Compare the atomic structure of specific isotopes.
O  Interpret the symbols on a periodic table.
P  Identify the atomic mass and # of specific elements.
Q  Given a molecular formula of a simple organic compound, translate to a structural formula.
R  Compare and contrast ionic, covalent and hydrogen bonding.
S  Identify biological examples of colloids, suspensions, and solutions.
T  Capably model the molecular structure of specific organic compounds.
U  Demonstrate an understanding of the concept of the pH scale.
V  Calculate the molecular weight of specific compounds.
W  Describe the synthesis and decomposition of sugars, proteins and lipids.
X  Identify the nutritional roles of proteins, lipids, carbohydrates, minerals, vitamins and H2O.
Y  Describe the structure and function of enzymes.
Z  List the optimum conditions for enzyme activity.
AA Write and recognize select chemical equations and diagrams displaying maltose synthesis and/or decomposition.
BB Write and recognize the empirical and structural formula for glycerol.
CC Write and recognize the empirical and structural formula for general fatty acids.
DD Write and recognize the empirical and structural formula for a generalized amino acid.
EE Write and recognize a balanced chemical equation or diagram showing lipid synthesis and/or decomposition of specific organic molecules.

VII Intro to Bio & the Nature of Science

A  List the key themes of biological science.
B  Explain how organisms acquire the energy they need to survive.
C  Distinguish the characteristics which identify living vs. non-living things.
D  Explain the steps of the research and technical methods of investigation.
E  Describe the role of observation in science.
F  Compare the concept of an hypothesis to that of a theory.
G  Write a hypothesis as an "If....then" statement.
H  Explain the role of experimentation in hypothesis testing.
I  Describe the purpose of scientific experimentation.
J  Transform experimental data into graphic form.
K  Explain the concepts of pure and applied science.
L  Identify, by name and function, the parts of the compound microscope.
M  Calculate the magnification range of the compound microscope.
N  Compare and contrast the functions, purposes, and magnification capabilities of specified light and electron microscopes.
O  Demonstrate an awareness of lab safety.
P  Capably utilize proper technique to prepare and examine a wet mount slide.