

Curriculum Map

Name of Teacher ____Yasmeen ____

Subject ____AP-BIO____

Unit/Theme The Molecular of Life
Enduring Understandings 1- The Science of Biology 2- The Nature of Molecules and the Properties of Water 3- The chemical building Blocks of life
Essential Questions 1- Explain the theory of natural selection 2- What is the structure of Atoms? 3- Explain the emergent properties of water 4- What is the impact of carbon as the “backbone of life”? 5- How monomers build polymers, including the roles of nucleic acid? 6- Describe the characteristic of living systems. 7- Describe the relationship between atomic structure and chemical properties. 8- Contrast polar and nonpolar covalent bonds. 9- Describe water’s cohesive and adhesive properties. 10- Define acids, bases, and the pH scale. 11- Explain what a high specific heat.
Activities. - Drawing charts
Assessments Formative (Throughout)
Summative (End of Year) - Evolution and natural selection Project - Cumulative test and quizzes about The Science of Biology, the Nature of Molecules and the Properties of Water, and the chemical building Blocks of life.
Time Frame/Month: Sep 5 -Sep 17, 2019
Resources/Websites(Primary/Secondary)
Textbook Name (Chapters/Pages) Raven, Johnson, et al., Biology, 11 th edition, 2017, Mc Graw Hill education. Pg. 1-58.

Unit/Theme Biology of the Cell
Enduring Understandings

Students will be able to:

- 1- The Flow of Energy in Living system
- 2- The laws of Thermodynamics and Free Energy
- 3- ATP: The Energy Currency of Cells
- 4- Enzymes: Biological Catalysts
- 5- Metabolism: The chemical Description of Cell Function
- 6- Overview of Respiration
- 7- The stages of Respiration
- 8- Energy Yield of Aerobic Respiration
- 9- Oxidation without O₂

Essential Questions

- 1- Differentiate between Kinetic and potential energy.
- 2- Identify the source of energy for the biosphere.
- 3- Describe the nature of redox reactions.
- 4- Explain the laws of thermodynamics.
- 5- Relate free energy changes to the outcome of chemical reactions.
- 6- Contrast the course of a reaction with and without an enzyme catalyst.
- 7- Describe the role of ATP in short-term energy storage.
- 8- Discuss the specificity of enzymes.
- 9- Explain how enzymes bind to their substrates.
- 10- List the factors that influence the rate of enzyme-catalyzed reactions.
- 11- Explain the kinds of reactions that make up metabolism.
- 12- Discuss what is meant by a metabolic pathway.
- 13- Explain the role of electron carriers in energy metabolism.
- 14- Describe the role of ATP in biological systems.
- 15- Describe the stages of respiration and calculate the energy yield.
- 16- Distinguish between aerobic respiration and fermentation.
- 17- What are the control points for cellular respiration?
- 18- Compare anaerobic and aerobic respiration.

Activities

Group Activity of answering questions related to the questions that I listed under essential questions.

- Cellular respiration and fermentation interactive questions worksheets.
- Cellular respiration Review worksheets.
- Watching different videos which support enduring understanding topics.

Assessments

Formative (Throughout)

Restate questions during the lecture

Summative (End of Year)

- Online HomeWorks
- Cumulative tests and quizzes about metabolism, enzymes, and cellular respiration.

Time Frame/Month Oct 1 - Oct 31, 2019

Resources/Websites(Primary/Secondary)

Textbook Name (Chapters/Pages)

Raven, Johnson, et al., Biology, 11th edition, 2017, Mc Graw Hill education. Pg. 107-146.

Unit/Theme

- Biology of the Cell
- Genetic and Molecular Biology

Enduring Understandings

Students will be able to:

- 1- Overview of photosynthesis
- 2- Pigments, and photosystem organization
- 3- The light -Dependent Reactions
- 4- Carbon fixation: The Calvin Cycle
- 5- Photorespiration
- 6- Overview of cell communication
- 7- Receptor types
- 8- Intracellular receptors
- 9- Signal transduction through receptor kinases, and G Protein-Coupled Receptors.
- 10- Bacterial cell division
- 11- Eukaryotic chromosomes
- 12- Overview of eukaryotic cell cycle
- 13- Control of the cell cycle
- 14- Sexual reproduction requires meiosis
- 15- Features of meiosis
- 16- The process of meiosis
- 17- Meiosis versus mitosis

Essential Questions

- 1- Explain the reaction for photosynthesis
- 2- Differentiate between the light-dependent and light-independent reactions
- 3- Discuss how pigments are important to photosynthesis
- 4- Contrast the function of reaction center and antenna chlorophyll molecules
- 5- Compare the function of the two photosystems in green plants
- 6- Describe carbon fixation
- 7- Compare the function of carbon fixation in the C3, C4, and CAM pathways
- 8- Discriminate between methods of signaling based on distance from source to reception.
- 9- Contrast the different types of receptors
- 10- Describe the chemical nature of ligands for intracellular receptors
- 11- Diagram the pathway of signal transduction through intracellular receptors.
- 12- Explain the role of kinase cascades in signal transduction
- 13- Relate the function of second messengers to signal transduction pathways
- 14- Describe the process of binary fission
- 15- Describe the structure of eukaryotic chromosomes
- 16- Distinguish between homologues and sister chromatids
- 17- Contrast replicated and nonreplicated chromosomes
- 18- Describe the eukaryotic cell cycle
- 19- Describe the phases of mitosis
- 20- Compare cytokinesis in plants and animals
- 21- Distinguish the role of checkpoints in the control of the cell cycle.
- 22- Describe cancer in terms of cell-cycle control.
- 23- Distinguish between germ-line and somatic cells
- 24- Characterize the function of meiosis in sexual reproduction.
- 25- Describe how homologous chromosomes pair during meiosis.
- 26- Explain why meiosis I is called the reductive division

27- Describe the behavior of chromosomes through both meiotic divisions 28- Describe the differences in chromatid cohesion in meiosis and mitosis
Activities Group Activities of answering questions related to the questions that I listed under essential questions. <ul style="list-style-type: none"> - Photosynthesis interactive questions worksheets. - photosynthesis Review worksheets. - Cell communication worksheets - Cell Division Review worksheets Watching different videos which support enduring understanding topics. Students present the whole chapter of photosynthesis.
Assessments Formative (Throughout) Restate questions during the lecture
Summative (End of Year) <ul style="list-style-type: none"> - Online Assignments - Outlines Homework - Cumulative tests and quizzes
Time Frame/Month Nov 4 - Nov 27, 2019
Resources/Websites(Primary/Secondary)
Textbook Name (Chapters/Pages) Raven, Johnson, et al., Biology, 11 th edition, 2017, Mc Graw Hill education. Pg. 147-220.

Unit/Theme Genetic and Molecular Biology
Enduring Understandings Students will be able to: <ol style="list-style-type: none"> 1- The mystery of heredity 2- Monohybrid crosses: the principle of segregation 3- Dihybrid crosses: the principle of independent assortment 4- Probability: predicting the results of crosses 5- The testcross: revealing unknown genotypes 6- Extensions of Mendel 7- Sex linkage and the chromosomal theory of inheritance 8- Sex chromosomes and sex determination 9- Exceptions to the chromosomal theory of inheritance 10- Genetic mapping 11- Selected human genetic disorders 12- The nature of genetic material 13- DNA structure 14- Basic characteristics of DNA replication 15- Prokaryotic replication 16- Eukaryotic replication 17- DNA repair
Essential Questions

- 1- Describe explanations for inheritance prior to Mendel
- 2- Evaluate the outcome of a monohybrid cross and a dihybrid cross
- 3- Explain Mendel's principle of segregation and the principle of independent assortment.
- 4- Explain the rule of addition and the rule of multiplication
- 5- Interpret the data from testcrosses to infer unknown genotypes
- 6- Explain the genetic basis for observed alterations to Mendel's ratios.
- 7- Describe sex- linked inheritance in fruit flies
- 8- Describe the relationship between sex chromosomes and sex determination
- 9- Explain the genetic consequences of dosage compensation in mammals
- 10- Describe the inheritance pattern for genes contained in a chloroplast or mitochondrion DNA
- 11- Explain how mutations can cause disease
- 12- Describe the consequences of nondisjunction in humans
- 13- Describe the experiments of Griffith and Avery
- 14- Evaluate the evidence for DNA as genetic material
- 15- Explain how Watson- Crick structure rationalized the data available to them
- 16- Evaluate the significance of complementary for DNA structure and function
- 17- Illustrate the products of semiconservative replication
- 18- Describe the requirements for DNA replication
- 19- Explain why replication is discontinuous on one strand
- 20- Diagram the functions found at the replication fork
- 21- Explain the function of telomeres
- 22- Explain the role of telomerase in cell division
- 23- Explain the mechanism of DNA repair.

Activities

Group Activities of answering questions related to the questions that I listed under essential questions.

- DNA the genetic material interactive questions worksheets.

Watching different videos which support enduring understanding topics.

Assessments

Formative (Throughout)

Restate questions during the lecture

Summative (End of Year)

- Online Assignments
- Outlines Homework
- Cumulative tests and quizzes

Time Frame/Month Dec 2 - Dec 19, 2019

Resources/Websites(Primary/Secondary)

Textbook Name (Chapters/Pages)

Raven, Johnson, et al., Biology, 11th edition, 2017, Mc Graw Hill education. Pg. 221-277.

Unit/Theme

Genetic and Molecular Biology

Enduring Understandings

Students will be able to understand:

- 1- The Nature of Genes
- 2- The Genetic Code
- 3- Prokaryotic Transcription

- 4- Eukaryotic Transcription
- 5- Eukaryotic pre-mRNA Splicing
- 6- The Structure of tRNA and Ribosomes
- 7- The Process of Translation
- 8- Mutation: Altered Genes
- 9- Control of Gene Expression
- 10- Prokaryotic Regulation
- 11- Eukaryotic Regulation
- 12- Chromatin Structure and Gene Expression
- 13- Eukaryotic Posttranscriptional Regulation
- 14- Protein Degradation

Essential Questions

- 1- Evaluate the evidence for the one-gene/one-polypeptide hypothesis
- 2- Distinguish between transcription and translation
- 3- List the roles played by RNA in gene expression
- 4- Summarize the experiments that revealed the genetic code
- 5- Describe the characteristics of the genetic code
- 6- Identify the relationship between codons and amino acids
- 7- Define and describe the unique features of prokaryotic transcription
- 8- Describe the processing of eukaryotic transcripts
- 9- Explain the relationship between genes and proteins in prokaryotes and eukaryotes
- 10- Describe the splicing reaction for pre-mRNA
- 11- Illustrate how splicing changes the nature of genes
- 12- Identify the tRNA-binding sites in the ribosome
- 13- Describe the process of translation
- 14- Explain the elongation cycle
- 15- Describe the effects of different point mutations
- 16- List the different chromosomal mutations and their effects
- 17- Identify when gene expression is usually controlled
- 18- List the differences between control of gene expression in prokaryotes and eukaryotes
- 19- Contrast control by induction and control by repression
- 20- Explain control of gene expression in the Lac operon
- 21- Explain control of gene expression in the trp operon
- 22- Describe the formation of a Pol II initiation complex
- 23- Describe at least two kinds of epigenetic mark
- 24- Differentiate between the different kinds of posttranscriptional regulation
- 25- Explain the function of the proteasome

Activities

Individual Activities of answering questions related to the questions that I listed under essential questions.

- Genes and how they work interactive questions worksheets
- Control of gene expression worksheets

Watching different videos which support enduring understanding topics.

Assessments

Formative (Throughout)

Practice online AP-Questions mostly in the beginning of each class

Summative (End of Year)

<ul style="list-style-type: none"> - Outlines Homework - Cumulative tests and quizzes
Time Frame/Month Jan 2 - Jan 31, 2020
Resources/Websites(Primary/Secondary)
Textbook Name (Chapters/Pages) Raven, Johnson, et al., Biology, 11 th edition, 2017, Mc Graw Hill education. Pg. 278-326.

<p>Unit/Theme Genetic and Molecular Biology Diversity of life on earth Evolution</p>
<p>Enduring Understandings Students will be able to understand:</p> <ol style="list-style-type: none"> 1- The Nature of Viruses 2- Bacteriophage: Bacterial Viruses 3- Human Viral Diseases 4- Bacterial defenses against phages 5- Retroviruses 6- Emerging Viruses 7- Plant Viruses 8- Prions 9- Prevention or treatment from the viral diseases 10- Recombinant DNA 11- Amplifying DNA using the polymerase chain reaction 12- Restriction Fragment Length Polymorphisms 13- Biotechnology Applications 14- Natural selection 15- Artificial selection 16- Evidence for evolution
<p>Essential Questions</p> <ol style="list-style-type: none"> 1- Describe the different structures found in viruses 2- Understand the basic mechanism of viral replication 3- Distinguish between lytic and lysogenic cycles in bacteriophage 4- Explain the replication mechanism of retroviruses 5- Explain the prevention process of viral disease 6- Describe how restriction endonucleases and ligases are used to make recombinant DNA 7- Explain how DNA fragments can be separated with gel electrophoresis and why this is useful 8- Describe the construction and uses of recombinant DNA libraries 9- Relate the process of DNA replication to PCR 10- Compare and contrast PCR, and RT-PCR 11- Explain how RFLPS is used to diagnose diseases 12- Describe the benefits of Biotechnology Applications 13- Compare and contrast natural selection vs. artificial selection 14- What are the key ideas of natural selections 15- List and define the evidences for evolution
Activities

Individual Activities of answering questions related to the questions that I listed under essential questions.

- Viruses interactive questions in class worksheet.
- In class worksheet about Biotechnology
- In class worksheet about the evidence of evolution

Watching different videos which support enduring understanding topics.

Assessments

Formative (Throughout)
Do Now Questions

- Summative (End of Year)
- Cumulative test

Time Frame/Month Feb 3 - Feb 16, 2020

Resources/Websites(Primary/Secondary)

Textbook Name (Chapters/Pages)

Raven, Johnson, et al., Biology, 11th edition, 2017, Mc Graw Hill education. Pg. 526-541,327-350, and 421-437.

Unit/Theme

Evolution
Diversity of Life on Earth
Plant Form and Function

Enduring Understandings

Students will be able to Understand:

- Genetic Variation and Evolution
- The evolution of population
- The origin of species
- The history of life on earth
- Phylogeny and the tree of life
- The evolution of seed plants
- Transport in plants
- Plant Nutrition and Soils
- Plant Reproduction

Essential Questions

- How natural selection serves as mechanism for evolution
- How allele frequencies can be altered in a population
- Describe the relationship of reproductive isolating mechanisms to the biological species concepts.
- Explain why only shared, derived characters indicate close evolutionary relationship.
- Relate timescale to genome evolution.
- Describe the history of life
- Describe the relationship between geological events and the evolution of life.
- List the evolutionary advantages of seeds.
- Predict the direction of water movement based on water potential.
- Explain how soil characteristics affect nutrient uptake by roots.
- Describe the general life cycle of a flowering plant.

Activities

Individual Activities of answering questions related to the questions that I listed under essential questions. - Watching different videos which support enduring understanding topics.
Assessments
Formative (Throughout) Do Now Questions
Summative (End of Year) Cumulative test
Time Frame/Month Mar 2 - Mar 31, 2020
Resources/Websites(Primary/Secondary)
Textbook Name (Chapters/Pages) Raven, Johnson, et al., Biology, 11 th edition, 2017, Mc Graw Hill education.

Unit/Theme
Review : <ul style="list-style-type: none"> - Chemistry of life - Biology of the Cell - Cell communication and cell cycle - Heredity - Gene Expression and Regulation
Enduring Understandings Students will be able to: <ul style="list-style-type: none"> - Structure of water and hydrogen bonding - Elements of life - Introduction to biological macromolecules - Properties of biological macromolecules - Structure and function of biological macromolecules - Nucleic acid - cellular energetics - Components of the cell - Cell Communication - Mendelian genetics - Non-Mendelian genetics - DNA and RNA Structure - Replication - Transcription and RNA Processing - Translation - Regulation of Gene Expression - Gene Expression and Cell Specialization - Mutation - Biotechnology
Essential Questions

Activities AP Review Questions
Assessments
Formative (Throughout)
Summative (End of Year)
Time Frame/Month April - May
Resources/Websites(Primary/Secondary)
Textbook Name (Chapters/Pages)