Name: _____ Advisor: _____

BIOLOGY@SECHS

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Edmodo: https://www.edmodo.com

Materials

- Tape
- Graph Paper
- Colored Pencils
- Index Cards
- Black or Blue Pens
- No. 2 Pencil
- Composition Notebook
- Graphing Calculator (Optional)

Course Description:
This Pre-AP Biology course is designed to provide a stimulating, challenging and relevant curriculum aimed at giving students tools and knowledge to succeed. In Pre-AP Biology, students will study living organisms and life processes by conducting field and lab investigations using science methods and making informed decisions using critical thinking and scientific problem solving. During this course, at least 40% of instruction will be used by the student to conduct field and lab investigations using safe, environmental appropriate, and ethical practices.

Prerequisite:
None

Text: Miller and Levine (2004). Biology. New Jersey: Pearson Prentice Hall.

Expectations:
Students are expected to become independent learners that use critical thinking and communication skills. They are also expected to take significant responsibility for their own learning. During this course students are expected to demonstrate an understanding of:

- scientific methods and the use of scientific equipment
- biomolecules as building blocks of cells, and that cells are the basic unit of structure and function of living things.
- how an organism grows and the importance of cell differentiation.

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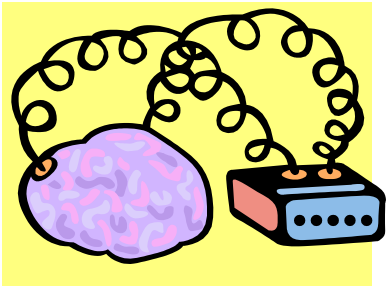
- the mechanisms of genetics.
- the theory of biological evolution and the hierarchical classification of organisms.
- metabolic processes, energy conversions, and interactions and functions of systems in organisms.
- the interdependence and interactions that occur within an environmental system and their significance.



Methodology:

To meet the standards of this class we will:

- use scientific methods and inquiry to design experiments and solve problems
- use class discussions
- work and learn in collaborative groups
- use interactive lectures and notebooks
- create individual and group projects.

Grading Policy – SCHOOL-WIDE:

40% Summative Assessments (6 weeks test, performance assessments, formal lab reports, research papers, science fair project individual and group projects),
25% Formative Assessments (quizzes, bi-weekly assessments, and lab reports)
20% Daily work/ Class work
15% Homework

Grading Scale: A= 100 – 90, B= 89 – 80, C = 79 – 75, D = 74 – 70, F= 69 and below

Overview of Student Products:

Formal Lab Reports

Students will have to write and type formal lab report for several labs. In these reports students will research and discuss the results of experimental investigations. A rubric will be used to grade the reports.

Individual and Group Projects

Several projects will be completed this year. These projects will be graded with a rubric which will distributed at the time the project is assigned.

Science Fair Project

You will have to complete a science fair project. This project must be an

investigation. It may be a continuation of lab we have done in class.

Plagiarism/cheating

Plagiarism is a serious academic offense. It is a level 2 offense according to the Student Code of Conduct. This behavior can result in a referral to the principal and notification of the offense to parents. Students who cheat or plagiarize will be given a zero on the assignment or assessment.

Content Outline

Processing Skills will be taught throughout the year.

(1) Scientific processes. The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:

(A) demonstrate safe practices during laboratory and field investigations; and

(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.

(2) Scientific processes. The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:

(A) know the definition of science and understand that it has limitations

(B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;

(C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;

(D) distinguish between scientific hypotheses and scientific theories;

(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;

(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals,

timing devices, cameras, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;

(G) analyze, evaluate, make inferences, and predict trends from data; and

(H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.

(3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:

(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;

(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;

(C) draw inferences based on data related to promotional materials for products and services;

(D) evaluate the impact of scientific research on society and the environment;

(E) evaluate models according to their limitations in representing biological objects or events; and

(F) research and describe the history of biology and contributions of scientists.

Cycle 1:

<table>
<tr><th colspan="3">Unit 1 Biomolecules</th></tr>
<tr><td colspan="3">Science Concepts: The student knows the significance of various molecules</td></tr>
<tr><td colspan="3">Learning Objectives:
Biol.1A demonstrate safe practices during laboratory and field investigations
Biol.1B demonstrates an understanding of the use and conservation of resources and the proper disposal or recycling of materials.</td></tr>
<tr><th>Duration</th><th>Description</th><th>Readings</th></tr>
<tr><td>ongoing</td><td>Students will review safety rules and be introduced to procedures that will be used in the classroom.</td><td>Safety Contract</td></tr>
<tr><td colspan="3">Learning Objectives:
BIOL.9A Compare the structures and functions of different types of biomolecules including carbohydrates, lipids, proteins, and nucleic acids.
BIOL.9D Analyze and evaluate the evidence regarding formation of simple organic molecules and their organization into long complex molecules having information such as the DNA molecule for self-replicating life.</td></tr>
<tr><th>Duration</th><th>Description</th><th>Readings</th></tr>
<tr><td>3</td><td>Students will learn the structure and function of different types of biomolecules, such as carbohydrates, lipids, proteins, and nucleic acids. Students are also introduced to different theories on how simple organic molecules first formed and how they are organized into complex molecules.</td><td>Pages 44-48</td></tr>
</table>

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Unit 2: Cell Structure and Function		
Science Concepts: The student knows that cells are the basic structures of all living things with specialized parts that perform specific functions.		
Learning Objectives: **BIOL.4A** compare and contrast prokaryotic and eukaryotic cells; **BIOL.4B** investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules		
Duration	**Description**	**Readings**
3	Students will identify cells as the basic structures of all living things and that they have specialized parts that perform specific functions such as transporting molecules, synthesizing new molecules, converting energy, and maintaining homeostasis.	Pages 172-189

Unit 3: Cell Growth and Differentiation		
Science Concepts: The student knows how an organism grows and the importance of cell differentiation.		
Learning Objectives: **BIOL.5A** describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms **BIOL.5B** examine specialized cells, including roots, stems, and leaves of plants; and animal cells such as blood, muscle, and epithelium **BIOL.5C** describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation **BIOL.5D** recognize that disruptions of the cell cycle lead to diseases such as cancer		
Duration	**Description**	**Readings**
3	Students will study the cell cycle and its significance to the growth of the cell. They will discover that disruptions to the cell cycle may lead to cancer. Students will also discover what factors contribute to cell differentiation.	Pages 172-193, 240-252, 297-299 and 307-312

Unit 4: Viruses		
Science Concepts: The student knows that cells are the basic structures of all living things with specialized parts that perform specific functions and that viruses are different from cells.		
Learning Objectives: **BIOL.4C** Compare the structures of viruses to cells, describe viral reproduction, and describe the role of viruses in causing diseases such as human immunodeficiency virus (HIV) and influenza		
Duration	**Description**	**Readings**
3	Students will gain knowledge of about the structure of viruses, viral reproduction, and the role viruses play ion causing diseases such as immunodeficiency virus and influenza. Students will also compare the structure of viruses to the structure of cells.	Pages 478-483 and 488-490

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CYCLE 2

Unit 5: Components of DNA		
Science Concepts: The student knows the mechanisms of genetics, including the role of nucleic acids and the principles of Mendelian Genetics.		
Learning Objectives: **BIOL.6A** identify components of DNA, and describe how information for specifying the traits of an organism is carried in the DNA **BIOL.6B** recognize that components that make up the genetic code are common to all organisms		
Duration	**Description**	**Readings**
2	Students will make model of DNA and identify the different components of a DNA molecule. They will also describe how genetic material is carried in DNA.	Pages 287-294

Unit 6: Transcription and Translation		
Science Concepts: The student knows the mechanisms of genetics, including the role of nucleic acids and the principles of Mendelian Genetics.		
Learning Objectives: **BIOL.6C** explain the purpose and process of transcription and translation using models of DNA and RNA **BIOL.6D** recognize that gene expression is a regulated process		
Duration	**Description**	**Readings**
3	Students will study how DNA is transcribed and translated into amino acids to make proteins.	Pages 295-297, 300-306 and 309-311

Unit 7: Mutations: Changes in DNA		
Science Concepts: The student knows the mechanisms of genetics, including the role of nucleic acids and the principles of Mendelian Genetics.		
Learning Objectives: **BIOL.6E** identify and illustrate changes in DNA and evaluate the significance of these changes		
Duration	**Description**	**Readings**
2	Students will gain knowledge of how a change in DNA will produce a mutation. They will also learn that mutations contribute to the diversity and this diversity makes natural selection and evolution possible.	Pages 307-308

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Unit 8: Genetic Combinations		
Science Concepts: The student knows the mechanisms of genetics, including the role of nucleic acids and the principles of Mendelian Genetics.		
Learning Objectives: **BIOL.6F** predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses and non-Mendelian inheritance **BIOL.6G** recognize the significance of meiosis to sexual reproduction **BIOL.6H** describe how techniques such as DNA fingerprinting, genetic modifications, and chromosomal analysis are used to study the genomes of organisms		
Duration	**Description**	**Readings**
3	Students will learn about the significance of genetic variation and will be taught the different genetic techniques used to study the genomes of organisms.	Pages 267-280 and 319-333

CYCLE 3

Unit 9: Natural Selection		
Science Concepts: The student knows evolutionary theory is a scientific explanation for the unity and diversity of life.		
Learning Objectives: **BIOL.7C** analyze and evaluate how natural selection produces change in populations, not individuals **BIOL.7D** analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success **BIOL.7E** analyze and evaluate the relationship of natural selection to adaptation and to the development of diversity in and among species		
Duration	**Description**	**Readings**
4	Students will learn about natural selection how it contributes to the diversity found among species.	Pages 369-382, 397-399, and 404-410

Unit 10: Evidence of Evolution		
Science Concepts: The student knows evolutionary theory is a scientific explanation for the unity and diversity of life.		
Learning Objectives: **BIOL.7A** analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental **BIOL.7B** analyze and evaluate scientific explanations concerning any data of sudden appearance, stasis, and sequential nature of groups in the fossil record		
Duration	**Description**	**Readings**
4	Students will analyze and evaluate the theory of biological evolution by examining evidence of common ancestry from DNA sequences, fossil records, biogeography, and anatomical developmental homologies.	Pages 352-386, 404-410, and 417-422

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Unit 11: Other Mechanisms of Evolution		
Science Concepts: The student knows evolutionary theory is a scientific explanation for the unity and diversity of life.		
Learning Objectives: **BIOL.7F** analyze and evaluate the effects of other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination **BIOL.7G** analyze and evaluate scientific explanations concerning the complexity of the cell.		
Duration	**Description**	**Readings**
1	Students will analyze other evolutionary mechanisms such as gene flow, genetic drift, mutation, and recombination.	Pages 320-321, 393-396, 400, 402

Unit 12: Biological Classification		
Science Concepts: The student knows that taxonomy is a branching classification based on the shared characteristics of organisms and can change as new discoveries are made.		
Learning Objectives: **BIOL.8A** define taxonomy and recognize the importance of a standardized taxonomic system to the scientific community **BIOL.8B** categorize organisms using a hierarchical classification system based on similarities and differences shared among groups **BIOL.8C** compare characteristics of taxonomic groups, including Archaea, bacteria, protists, fungi, plants, and animals		
Duration	**Description**	**Readings**
3	Students will learn that organisms are classified by the similarities and differences and then placed at several taxonomic levels.	Pages 447-461

CYCLE 4

Unit 13: Homeostasis: Keeping Life in Balance		
Science Concepts: The student knows that biological systems work to achieve and maintain balance.		
Learning Objectives: **BIOL.11A** describe the role of internal feedback mechanisms in the maintenance of homeostasis **BIOL.11B** investigate and analyze how organisms, populations, and communities respond to external factors **BIOL.11C** summarize the role of microorganisms in both maintaining and disrupting the health of both organisms and ecosystems		
Duration	**Description**	**Readings**
4	Students will study how organisms work to stay alive by attempting to maintain homeostasis while responding to stimuli both externally and internally	Pages 895-896, 822-823, 854-855, 19, 597, 600, 658-659, 935, 895, 988-889, 1000-1002, and 1007

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Unit 14: Biological Processes in Animals and Plants		
Science Concepts: The student knows that biological systems work to achieve and maintain balance.		
Learning Objectives: **BIOL.9B** compare the reactants and products of photosynthesis and cellular respiration in terms of energy and matter **BIOL.9C** identify and investigate the role of enzymes		
Duration	**Description**	**Readings**
4	Students will examine metabolic processes, photosynthesis and cellular respiration, which occur in both animals and plants.	Pages 49-53, 201-214, and 221-232

Unit 15: Biological Systems in Animals and Plants		
Science Concepts: The student knows that biological systems are composed of multiple levels.		
Learning Objectives: **BIOL.10A** describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals **BIOL.10B** describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants **BIOL.10C** analyze the levels of organization in biological systems and relate the levels to each other and to the whole system		
Duration	**Description**	**Readings**
5	Students will investigate the interactions that occur among system in plants and animals that perform various functions	Pages 890-1049

CYCLE 5

Unit 16: Matter and Energy Flow in Ecosystems		
Science Concepts: The student knows that interdependence and interactions occur within an environmental system.		
Learning Objectives: **BIOL.12C** analyze the flow of matter and energy through trophic levels using various models, including food chains, food webs, and ecological pyramids **BIOL.12E** describe the flow of matter through the carbon and nitrogen cycles and explain the consequences of disrupting these cycles **BIOL.12F** describe how environmental change can impact ecosystem stability		
Duration	**Description**	**Readings**
5	Students will learn about matter and energy flow through various cycles and through different trophic levels between organisms and their environment.	Pages 62-74 and 87-89

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Unit 17: Variations and Adaptations in Ecosystems		
Science Concepts: The student knows that interdependence and interactions occur within an environmental system.		
Learning Objectives: **BIOL.11D** describe how events and processes that occur during ecological succession can change populations and species diversity **BIOL.12B** compare variations and adaptations of organisms in different ecosystems **BIOL.12D** recognize that long-term survival of species is dependent on changing resource bases that are limited		
Duration	**Description**	**Readings**
4	Students will gain knowledge of variations and adaptations of organisms that help them grow, reproduce, and survive in different ecosystems.	Pages 98-105 and 118-127

Unit 18: Ecosystems Relationships		
Science Concepts: The student knows that interdependence and interactions occur within an environmental system.		
Learning Objectives: **BIOL.12A** interpret relationships, including predation, parasitism, commensalism, mutualism, and competition among organisms		
Duration	**Description**	**Readings**
3	Students will gain knowledge of the interactions of organisms in an ecosystem including commensalism, mutualism, parasitism, and predator-prey relationships	Pages 91-93

CYCLE 6

Unit 19: Independent Research		
Learning Objectives: **BIOL.2E** plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology **BIOL.2F** collect and organize qualitative and quantitative data and make measurements with accuracy and precision **BIOL.2G** analyze, evaluate, make inferences, and predict trends from data **BIOL.2H** communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports **BIOL.3B** communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials **BIOL.3C** draw inferences based on data related to promotional materials for products and services **BIOL.3D** evaluate the impact of scientific research on society and the environment **BIOL.3F** research and describe the history of biology and contributions of scientists		
Duration	**Description**	**Readings**
12	Students will plan and implement scientific investigations through real-life applications of current science issues	TBA

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