Course Title: Advanced Placement Biology

Meeting Times: The class will meet every other weekday on the block schedule for eighty minutes.

Lab Times: The labs will take place during the regular class periods, which are every other weekday on the block schedule for eighty minutes. However, some of the labs require considerably more than the time allotted to a block period, so the student is expected to meet after school and/or during seminar, as required, to complete the lab to the satisfaction of the instructor.

Course Description:

AP Biology provides an understanding of the unifying themes and fundamental concepts and principles of biology with an emphasis on inquiry and critical thinking skills including: problem solving, mathematical reasoning, and experimental investigations. Topics of study include: molecules and cells, heredity and evolution, and organisms and populations each considered in the context of societal and environmental concerns. Laboratory work is an integral component of this course. Technology including graphing calculators, probeware, graphing and data analysis software, and biological apparatus is used throughout this course.

Though our system has an open enrollment policy, students should understand that this course is designed to be a second year biology course, and the equivalent of a two-semester long introductory, college level biology course. The course requires a working knowledge of biology and chemistry. The breadth, pace and depth of material covered exceeds the standard high school Biology course, as does the college-level textbook, laboratory work, and time and effort required of students. This course provides the biology foundations for college majors in biology. Students are expected to take the AP Biology Exam at the end of this course.

Course Purpose and Goals:

Philosophy

Scientific inquiry is basic to scientific thinking. Students conduct the recommended AP Biology well-designed investigations in this class in which they: 1) form testable questions and hypotheses, 2) conduct appropriate investigative procedures, including the identification and control of appropriate variables, 3) organize, display and critically analyze results, 4) draw inferences, summarize results and develop conclusions, and 5) communicate their results for critique by others. There is a strong lab component in my class with questioning, synthesis, and writing conclusions based on data.

The instruction in this course is designed and sequenced to provide students with learning opportunities that will help them contribute to society as responsible reflective thinkers and realize the international links in the study of living organisms. The methods include laboratory experiments, classroom lecture, collaborative peer-to-peer discussions, forms of technology, and field study. Teaching strategies include the recommended AP Biology in depth laboratory investigations, demonstrations, and discussions. Most of the labs are student conducted and one of my primary goals is give students the opportunity to learn advanced lab techniques.

Goals

1. To develop a conceptual understanding of the major themes of modern biology (evolution, energy transfer, continuity and change, structure and function, regulation, and interdependence) as a vehicle to investigate the concepts, principles, and topics of biology.
2. To develop and apply scientific inquiry and critical thinking skills, through active hands-on participation in the asking and answering of testable questions, and employing the components of a well-designed experimental investigation.
3. To foster scientific habits of mind including curiosity, creativity, and objectivity; and appreciate science as a process rather than an accumulation of knowledge.
4. To apply an understanding of biological knowledge and scientific methodology in the context of societal and environmental concerns.

Conceptual Organization:

The students are exposed to the equivalent of a college introductory biology course, meaning that the content and level of depth of the material is equivalent to a college level course. As with university courses, it is expected that students will be independent learners. Scientific inquiry is an integral component of this course, the elements of the well-designed investigation and the nature of the scientific methods are taught within the context of the topics, rather than treated as a separate introductory unit. As students investigate phenomena they extend their understanding of forming testable questions and hypotheses. Laboratory techniques are learned in the direct application of their use, rather than as a generic exercise isolated from their setting of application. Methods to collect, organize and display data are learned within the authentic use of real experimental data. This approach of learning uses the investigative skills within and throughout the authentic need of using and applying the skills.

The order of topics within the course, not only provides a logical and systemic study to biology, but also accommodates the frequent transfer of students within the schools of the system, so that transfer students can maintain a consistent flow of learning. The major themes are studied as follows: Science as Process; Evolution; Energy Transfer; Continuity and Change; Relationship of Structure to Function; Regulation; Interdependence in Nature; and Science, Technology and Society. These themes are integrated throughout the course.

Course Format and Policies:

This school system calculates weighted grades for students who complete the course and following the course take the requisite exam of an Advanced Placement (AP) Course. That is to say that if you complete the course and take the end of the year AP Biology exam, your grade is weighted as follows:

Unweighted Scale A=4	Weighted Scale A=5
Unweighted Scale B=3	Weighted Scale B=4
Unweighted Scale C=2	Weighted Scale C=3
Unweighted Scale D=1	Weighted Scale D=2
Unweighted Scale F=0	Weighted Scale F=0

Assessment:

- *Labs will make-up approximately 30% of the final grade.*
- *Exams, essays, and quizzes will make-up approximately 50% of the final grade.*
- *The comprehensive final exam will make-up approximately 20% of the semester grade.*

Textbook, Materials and Other Resources:

Required Textbook

- Campbell, Neil A. and Jane B. Reece. 2002. *Biology*, 6th edition, San Francisco, CA: Benjamin Cummings/Pearson Education.

Supplemental Textbooks and Readings

1. Bridgman, P. W. "Scientists and Social Responsibility," *Bulletin of the Atomic Scientists*, Vol. 4 (March 1948), pp. 69-75.
2. Carson, Rachel. *Silent Spring*, Houghton Mifflin Company, 1994.
3. Crick, Francis. *What Mad Pursuit*, Basic Books Inc, 1988.
4. De Kruif, Paul. *Microbe Hunters*, Harcourt Brace & Company, 1996.
5. Goldberg, Deborah T. *Barron's How to Prepare for the Advanced Placement Biology Exam*, Barron's Educational Series, Inc., 2004.
6. Gould, Stephen Jay. *Time's Arrow/Time's Cycle*, Harvard University Press, 1987.
7. Snow, C. P. *The Two Cultures*, Cambridge University Press, 1993.
8. Taylor, Martha R. *Student Study Guide for Biology Campbell – Reece Sixth Edition*, Benjamin Cummings/Pearson Education, 2002.
9. Watson, James D. *The Double Helix*, Penguin Books Ltd, 1969.
10. Wilke, C. D. "On the Police of Nature," (Linnaeus), Select Dissertations from the Amoenitates academicae, trans. F. J. Brand (London, 1781), pp. 129-166.

Other Resources

- Laboratory classroom that includes the space, facilities and equipment to conduct hands-on, inquiry-based investigations.
- Data gathering, graphing, analysis and presentation software including databases, spreadsheets and probeware interfaces.
- Graphing calculators
- Internet access and online resources.

Course Content Outline:

*Assignments: End of chapter questions, AP practice tests, and corresponding study guide questions focusing on problem areas.

AP Biology Course Outline				
Week	**Themes and Content**	**Labs/Activities**	**Readings**	**Assessments**
Area I: Molecules and Cells (25%) **Cells are the structural and functional units of life; cellular processes are based on physical and chemical changes.**				
1	**Introduction** **1. The Nature of Science: students engage in the nature of scientific reasoning.** **2. The Nature of Life: students learn the characteristics that identify living organisms.**	Nature of Science, Measurement, and Safety in the Lab	Chapter 1	
2-3	**Chemistry of Life** **1. Water: students study the water molecule and the qualities that make it so valuable to living organisms.** **2. Organic molecules in organisms: students study the various carbon based molecules.** **3. Free energy changes : students are asked to describe the movement of energy in chemical change.** **4. Enzymes: students study the enzymes and enzyme mediated reactions.**	Animal Behavior Lab Enzyme Catalysis Lab	Chapters 2 and 3	Quizzes chapters 2- 6 **Essay** on Enzymes **Essay** on Carbon Molecules Science Lab Portfolios Exam Unit 1
4-6	**Cells** **1. Prokaryotic and Eukaryotic Cells: students compare the two types of cells.** **2. Membranes: students learn the structure of membranes and the methods of cellular communications with the environment.** **3. Subcellular Organization: the focus is the metabolic activity in the cell.** **4. Cell Cycle and Its Regulation: students study the cell cycle and its contribution to living organisms.**	Diffusion and Osmosis Lab Mitosis and Meiosis Lab	Chapters 7-8, 11-12	**Essay** Plant and Animal Cells Science Lab Portfolios

7-8	**Cellular Energetics : students investigate the processes below focusing on the connections between them and the importance to the organism.** **1. Coupled R the history of ideas and landmark contributions of scientists in discovery of DNA as the genetic material, as well as the structure of DNA. Students investigate the new evidence of DNA as it contributes to theories of evolution.** **eactions** **2. Fermentation and Cellular Respiration** **3. Photosynthesis**	Cell Respiration Lab	Chapters 9-10	Exam chapters 7-12 Science Lab Portfolios
Area II: Heredity and Evolution (25%) **Hereditary events control the passage of structural and functional information from one generation to the next.**				
9-10	**Heredity** **1. Meiosis and Gametogenesis: students study the process of meiosis and compare and contrast spermatogenesis and oogenesis.** **2. Eukaryotic Chromosomes: students study chromosomes and Mendelian genetics. Students also investigate the ideas of Mendelian genetics and how they may contribute to the the process of natural selection, a mechanism of the theory of evolution.** **3. Inheritance Patterns: students study inheritance patterns and work genetics problem sets focusing heavily on probability of inheritance.**	Population Genetics and Evolution Lab (Hardy-Weinberg)	Chapters 13-15	Science Lab Portfolios 13-15 **Essay** Cell Respiration Exam chapters 13-15
11-13	**Molecular Genetics: students investigate the Human Genome Project and the history of ideas and landmark contributions of scientists in discovery of DNA as the genetic material, as well as the structure of DNA. Students investigate the new evidence of DNA as it contributes to theories of evolution. Students participate in a series of informative discussions of modern topics in science and ethics of cloning and consider societal and environmental concerns.**	Molecular Biology Lab Genetics of Organisms Lab	Chapters 16-21	**Essay** DNA Exam chapters 16-21

	1. RNA & DNA Structure/Function: students study replication of DNA, transcription, and translation - formation of proteins. 2. Gene Regulation: students study processes of gene regulation. 3. Mutation: students study the process of mutation and its effects. 4. Viral Structure and Replication: students study the anatomy of viruses, the important studies of viruses, and their activity. 5. Nucleic Acid Technology and Applications: students investigate modern studies of nucleic acids and the significance, considering ethical issues.			
14-15	**Evolutionary Biology: students investigate the evidence of fossil studies and modern chromosomal studies and place these in the context of the study of mechanisms for the process. Students study the acceptance or rejection of theories historically and societal concerns. 1. Early Evolution of Life 2. Evidence for Evolution 3. Mechanisms of Evolution**	Plant Pigment Lab	Chapters 22-26	Exam chapters 22-26 **Essay** Mendelian Genetics
Area III: Organisms and Populations (50%) The relationship of structure to function is a theme that is common to all organisms; the interactions of organisms with their environment are the major theme in ecology.				
16-17	**Diversity of Organisms: students investigate a variety of population studies and methods of investigation and place these in context of genetic ideas. 1. Evolutionary Patterns 2. Survey of the Diversity of Life 3. Phylogenetic Classification 4. Evolutionary Relationships**	Physiology of the Circulatory System	Chapters 27-34	Exam chapters 27-34 **Essay** Evolutionary Adaptations
18-28	**Structure and Function of Plants and Animals 1. Reproduction, Growth, and Development: students learn about the relationships and defining traits of major groups of organisms. 2. Structural, Physiological, and Behavioral Adaptations: students**	Transpiration Lab	Chapters 35-49	Exam chapters 35-49 Science Lab Portfolio **Essay** Ecology

	identify the adaptations of organisms making them suited to their environment. **3. Response to the Environment: students study plant and animal responses to environmental changes.**			
29-31	**Ecology** **1. Population Dynamics: students study the important characteristics of populations and factors affecting growth.** **2. Communities and Ecosystems: students examine data of a variety of ecosystems and analyze the community factors.** **3. Global Issues: students examine important topics such as global warming, the greenhouse effect, and the history of ideas regarding man's place in the environment.**	Dissolved Oxygen Lab	Chapters 50-55	Exam chapters 50-55 Science Lab Portfolio
32	**Review for AP Exam**			
33-34	**Comparative Anatomy: students relate animal form, function and correlation of the organ systems.**	Earth Worm Dissection Crayfish or Fish Dissection Fetal Pig Dissection	Chapters 40-49	Science (Portfolio) notebooks labs
35-36	**Field Studies: students examine an ecosystem and count and analyze the organisms in a plot, as well as study the structure of a flower.**	Field Survey Lab Flower Dissection	Chapter 30	Science (Portfolio) notebooks labs

Independent Research

Students are required to design and conduct an independent research project. Scientific inquiry is nurtured in this experience and this is an integral component of the course. Students are required to submit the project components to the instructor for critical comments and revise if necessary to reach an acceptable level of mastery. Students are required to write their findings and analysis of the research project in a formal lab report. Students are required to present their project at the local science symposium.

Laboratory Experience

Laboratory investigations are an integral component of this course. These investigations are equivalent to those in a college level laboratory course. The lab work in this course supports, enhances and extends the concepts and principles presented in the classroom. They also provide students with the opportunity to learn and apply new laboratory skills, foster collaborative relationships with others, and improve problem-solving skills.

The laboratory investigations are inquiry based, student-centered and are a primary vehicle for learning the fundamental concepts and principles of biology. This includes active use of the well-designed investigation in which students 1) form testable questions and hypotheses, 2) design and conduct appropriate investigative procedures, including the identification and control of appropriate variables, 3) collect data carefully, and organize, display and critically analyze results, and conduct error analysis, 4) draw inferences, summarize results and develop conclusions, and 5) communicate their results for critique by others. Laboratory investigations reflect a balance of structured, guided and open-ended inquiry.

Students are required to keep a laboratory journal. Because colleges often require students to present their laboratory materials from AP courses before granting college credit for laboratory, students are expected to retain their laboratory notebooks, report, and other materials. They are required to turn in a lab write up for each lab, except dissection, microscope studies, and model building, which require drawings. I do not require students to do busy work, such as to write out detailed procedures for the labs if I have provided this.

Lab Exercises

No.	Laboratory Title and Overview	Goals: Before and After Lab	Time
IA	INQUIRY and the NATURE of SCIENCE Laboratory: In this laboratory students will explore concepts via inquiry and hypothesis development. Students will also cover skills for viewing scientific work through a critical lens. Students will review measurement skills and accuracy. Students will review lab safety.	After the lab you should be able to: • conduct inquiry investigations • be a critical reader of scientific information • understand the nature of science and inquiry	1 block period Teacher led demonstration
1	DIFFUSION AND OSMOSIS: In this laboratory you will investigate the process of diffusion and osmosis in a model of a membrane system. You also will investigate the effect of solute concentration on water potential as it relates to living plant tissues.	Before the Lab you should understand: • the mechanisms of diffusion and osmosis and their importance to cells • the effects of solute size and concentration gradients on diffusion across selectively permeable membranes • the effects of a selectively permeable membrane on diffusion and osmosis between two solutions separated by the membrane • the concept of water potential • the relationship between solute concentration and pressure and the water potential of a solution • the concept of molarity and its relationship to osmotic concentration After the Lab you should be able to: • measure the water potential of a solution in a controlled experiment • determine the osmotic concentration of living tissue or an unknown solution from experimental data • describe the effects of water gain or loss in animal and plant cells • relate osmotic potential to solute concentration and water potential	3 block periods and one block seminar period with one hour after school Wet lab
2	ENZYME CATALYSIS: In this laboratory you will measure the amount of product generated and then calculate the rate of conversion of hydrogen peroxide (H_2O_2) to water and oxygen gas by the enzyme catalase.	Before the Lab you should understand: • the general functions and activities of enzymes • the relationship between the structure and function of enzymes • the concepts of initial reaction rates of enzymes	3 block periods and one block seminar period with one hour after

		• how the concept of free energy relates to enzyme activity • how pH relates to enzyme activity • that changes in temperature, pH, enzyme concentration, and substrate concentration can affect the initial reaction rates of enzyme-catalyzed reactions After the Lab you should be able to: • measure the effects of changes of temperature, pH, enzyme concentration, and substrate concentration on reaction rates of an enzyme-catalyzed reaction in a controlled experiment • explain how environmental factors affect the rate of enzyme-catalyzed reactions	school Wet lab
3	MITOSIS AND MEIOSIS: Exercise 3A is a study of mitosis. You will use prepared slides of onion root tips to study plant mitosis and to calculate the relative duration of the phases of mitosis in the meristem of root tissue. Prepared slides of the whitefish blastula will be used to study mitosis in animal cells and to compare animal mitosis and plant mitosis Exercise 3B is a study of meiosis. You will simulate the stages of meiosis by using chromosome models. You will study the crossing over and recombination that occurs during meiosis.	Before the Lab you should understand: • the key mechanical and genetic differences between meiosis and mitosis • the events of mitosis in animal and plant cells • the events of meiosis (gametogenesis) in animal and plant cells After the Lab you should be able to: • recognize the stages of mitosis in a plant or animal cell • calculate the relative duration of the cell cycle stages • describe how independent assortment and crossing over can generate genetic variation among the products of meiosis • use chromosome models to demonstrate the activity of chromosomes during Meiosis I and Meiosis II • relate chromosome activity to Mendelian segregation and independent assortment • calculate the map distance of a particular gene from a chromosome's center for between two genes using an organism of your choice in a controlled experiment • demonstrate the role of meiosis in the formation of gametes using an organism of your choice, in a controlled experiment • compare and contrast the results of meiosis and mitosis in plant cells • compare and contrast the results of meiosis and mitosis in animal cells	4 block periods and one block seminar period Wet lab

4	PLANT PIGMENTS AND PHOTOSYNTHESIS: In this laboratory you will separate plant pigments using chromatography. You also will measure the rate of photosynthesis in isolated chloroplasts. The measurement technique involves the reduction of the dye, DPIP. The transfer of electrons during the light-dependent reactions of photosynthesis reduces DPIP and changes its color from blue to colorless.	Before the Lab you should understand: • how chromatography separates two or more compounds that are initially present in a mixture • the process of photosynthesis • the function of plant pigments • the relationship between light wavelength or light intensity and photosynthetic rate After the Lab you should be able to: • separate pigments and calculate their Rf values • describe a technique to determine photosynthetic rates • compare photosynthetic rates at different temperatures, different light intensities, and different wavelengths of light in a controlled experiment • explain why the rate of photosynthesis vary under different environmental conditions	1 block period Dry lab
5	CELL RESPIRATION: Seeds are living but dormant. When conditions necessary to begin growth are achieved, germination occurs, cellular reactions are accelerated, and the rate of respiration greatly increases. In this laboratory you will measure oxygen consumption during respiration as the change in gas volume in respirometers containing either germinating or nongerminating lentils. In addition, you will measure the respiration of these lentils at two different temperatures.	Before the Lab you should understand: • how a respirometer works in terms of the gas laws • the general process of metabolism in living organisms After the Lab you should be able to: • test the effects of temperature on the rate of cell respiration in ungerminated versus germinated seeds in a controlled experiment • calculate the rate of cell respiration from experimental data • relate gas production to respiration rate	3 block periods and one block seminar period with 2-3 hours after school Wet lab
6	MOLECULAR BIOLOGY: In this laboratory, you will investigate some basic principles of genetic engineering. Plasmids containing specific fragments of foreign DNA will be used to transform Escherichia coli cells, conferring antibiotic (ampicillin) resistance. Restriction enzyme digests of phage lambda DNA also will be used to demonstrate techniques for separating and identifying DNA fragments using gel	Before the Lab you should understand: • how gel electrophoresis separates DNA molecules present in a mixture • the principles of bacterial transformation • the conditions under which cells can be transformed • the process of competent cell preparation • how a plasmid can be engineered to include a piece of foreign DNA • how plasmid vectors are used to transfer genes	2 block periods Wet lab

	electrophoresis.	• how antibiotic resistance is transferred between cells • how restriction endonucleases function • the importance of restriction enzymes to genetic engineering experiments After the Lab you should be able to: • use plasmids as vectors to transform bacteria with a gene for antibiotic resistance in a controlled experiment • demonstrate how restrictions enzymes are used in genetic engineering • use electrophoresis to separate DNA fragments • describe the biological process of transformation in bacteria • calculate transformation efficiency • be able to use multiple experimental controls • design a procedure to select positively for antibiotic resistant transformed cells • determine unknown DNA fragment sizes when given DNA fragments of known size	
7	GENETICS OF ORGANISMS: In this laboratory, you will use fruit flies to do genetic crosses. You will learn how to collect and manipulate fruit flies, collect data from F1 and F2 generations, and analyze the results from a monohybrid, dihybrid, or sex-linked cross.	Before the Lab you should understand: • chi-square analysis of data • the life cycle of diploid organisms useful in genetics studies After the Lab you should be able to: • investigate the independent assortment of two genes and determine whether the two genes are autosomal or sex-linked using a multi-generation experiment • analyze the data from your genetic crosses chi-square analysis techniques	2 block periods Wet lab
8	POPULATION GENETICS AND EVOLUTION: In this activity, you will learn about the Hardy-Weinberg law of genetic equilibrium and study the relationship between evolution and changes in allele frequency by using your class as a sample population.	Before the Lab you should understand: • how natural selection can alter allelic frequencies in a population • the Hardy-Weinberg equation and its use in determining the frequency of alleles in a population • the effects on the allelic frequencies of selection against the homozygous recessive or other genotypes	3 block periods Wet lab

		After the Lab you should be able to: • calculate the frequencies of alleles and genotypes in the gene pool of a population using the Hardy-Weinberg formula • discuss natural selection and other causes of microevolution as deviations from the conditions required to maintain Hardy-Weinberg equilibrium	
9	TRANSPIRATION: In this laboratory, you will apply what you learned about water potential from Laboratory 1 (Diffusion and Osmosis) to the movement of water within the plant. You will measure transpiration under different laboratory conditions. You also will study the organization of the plant stem and leaf as it relates to these processes by observing sections of tissue.	Before the Lab you should understand: • how water moves from roots to leaves in terms of physical/chemical properties of water and the forces provided by differences in water potential • the role of transpiration in the transport of water within a plant • the structures used by plants to transport water and regulate water movement After the Lab you should be able to: • test the effects of environmental variables on rates of transpiration using a controlled experiment • make thin section of stem, identify xylem and phloem cells, and relate the function of these vascular tissues to the structures of their cells	3 block periods and one block seminar period with 2-3 hours after school Wet lab
10	PHYSIOLOGY OF THE CIRCULATORY SYSTEM: In Exercise 10A, you will learn how to measure blood pressure. In Exercise 10B, you will measure pulse rate under different physiological conditions: standing, reclining, after the baroreceptor reflex, and during and immediately after exercise. The blood pressure and pulse rate will be analyzed and related to a relative fitness index. In Exercise 10C, you will measure the effect of temperature on the heart rate of the water flea, Daphnia magna.	Before the Lab you should understand: • the relationship between temperature and rates of physiological processes • basic anatomy of various circulatory systems After the Lab you should be able to: • measure heart rate and blood pressure in a human volunteer • describe the effect of changing body position on heart rate and blood pressure • explain how exercise changes heart rate • determine a human's fitness index • analyze pooled cardiovascular data • discuss and explain the relationship between heart rate and temperature	3 block periods and one block seminar period Wet lab

11	ANIMAL BEHAVIOR: In this laboratory, you will observe the behavior of an insect and design an experiment to investigate its responses to environmental variables. You also will observe and investigate mating behavior.	Before the Lab you should understand: • the concept of distribution of organisms in a resource gradient • the difference between a kinesis and a taxis After the Lab you should be able to: • measure the effects of environmental variables on habitat selection in a controlled experiment • describe the different types of insect mating behaviors	3 block periods and one block seminar period with one hour after school Wet lab
12	DISSOLVED OXYGEN AND AQUATIC PRIMARY PRODUCTIVITY: In Exercise 12A, you will measure and analyze the dissolved oxygen concentration in water samples at varying temperatures. In Exercise 12B, you will measure and analyze the primary productivity of natural waters or laboratory cultures as a function of light intensity.	Before the Lab you should understand: • the biological importance of carbon and oxygen cycling in ecosystems • how primary productivity relates to the metabolism of organisms in an ecosystem • the physical and biological factors that affect the solubility of gasses in aquatic ecosystems • the relationship between dissolved oxygen and the process of photosynthesis and respiration as they affect primary productivity After the Lab you should be able to: • measure primary productivity based on changes in dissolved oxygen in a controlled experiment • investigate the effects of changing light intensity and/or inorganic nutrient concentrations on primary productivity in a controlled experiment	2 block periods Dry lab
13 A B C	Crayfish /Frog /Fish Dissection *The Fetal Pig Dissection	Before the Labs you should understand: • the characteristics of each organism and the classification of each • the basic dissection techniques for each organism • the directional terminology of the specimens • the safety procedures of the dissection tools and specimens After the Labs you should be able to: • identify the internal structures of animals • discuss how organs and tissues are	1 block period each and 1 block seminar and 1 hour after school Wet lab

		interrelated • compare organisms in terms of their organs and relative complexities	
14 A B	Field Survey Lab Flower Dissection	Before the Lab you should understand: • The history of the site • sampling technique to be used • precise locating and recording of positions After the Lab you should be able to: • Identify diversity of flora and fauna in the region • Identify reproductive parts of flower	2 block periods Wet lab
TOTAL Laboratory hours			59

Assessment:

Assessment and evaluation are essential to learning and teaching. Ongoing assessment and evaluation are significant in supporting student achievement, motivating student performance and providing the basis upon which teachers make meaningful instructional decisions. All aspects of progress in science are measured using multiple methods such as authentic assessments, performance assessments, formative assessments, observational assessments, lab reports, projects, research activities, reports, and conventional summative assessments. Student understanding is evaluated using an assessment cycle that includes pre-test, formative assessments and summative assessments. Pre-tests are used to determine where the student understanding level is. The pre-tests are used by the teacher to plan instruction. Formative assessments are used to check student understanding while learning is occurring, and provide students and teachers with learning progress information. Pre and formative assessments are not used to determine grades. Summative assessments, such as unit and semester tests, evaluate student achievement, and along with other measures such as laboratory and project work are data points used to determine the level of student performance.

Assessment Type	Goal	Description
Science Lab Portfolios	To assess understanding of concepts, principles, and application of skills and processes of the laboratory.	Students maintain laboratory journals of all lab work. It includes lab notes, data, graphs, and responses to questions, lab write-ups, error analysis, and further research ideas. Students are required to keep their lab portfolios to demonstrate lab activity in a college AP review.
Quizzes	To assess understanding of concepts.	Short announced quizzes of some of the chapter reading assignments will encourage students to keep up with studies on a daily basis and review the notes.
Timed Essays	To evaluate the conceptual understanding and expository writing abilities.	Timed announced essays will ensure growth in the area of composing written responses to topic prompts. Students will be instructed in the art of writing expository essays and will work alone or with partners. Students are encouraged to prepare for essay writing in advance.
Exams	To assess understanding of concepts.	Multiple choice exams of each unit will be administered and will be modeled on the end of the year exam. Students are encouraged to study for these using the end of the chapter questions, student study guides, and the AP Biology study guide books.