

Vision Charter School

2011-2012

1. **Course Number and Title:** General Biology 03051
2. **Course Description:** A survey of biological concepts with an emphasis on cellular activity including: components of plant and animal cells, cell division, and cellular respiration. The course will also cover DNA & Genetics, bio-technology, simple & complex organisms, viruses, bacteria, and a basic knowledge of animal anatomy.
3. **Credit Hours:** 2
4. **Course Prerequisites:** 2 years of General Science.
5. **Course Dates:** 8/17/11 through 5/25/12
6. **Course Times:** 1st period (8:15-9:50) B days.
7. **Course Location:** Vision Charter School (room G-1)
8. **Instructor:** Jason George *Email:* jasongeorge@visioncsd.org
9. **Required Text and Other Learning Resources:**
10. **Course Overview:** This course designed to give students a solid foundation in Cellular Biology so that the student can progress into other college level science courses. The course will provide students with fundamental concepts in Biology and help students to gain the experience and appreciation for the most basic components of life through inquiry and experimentation. Students will be challenged to engage in the scientific method so they can solve real world problems and become critical thinkers.
11. **Course Calendar/Schedule (Tentative):**

1st Quarter Topics	Suggested Activities/Lessons	Student Objectives based on National Science Education Standards	Idaho State Standards
-Biology Portfolios -Science as Inquiry -The Cell -Enzymes -Osmosis/ Diffusion -Mitosis	<u>Biology Inquiries (Chapter 2 & 3):</u> -Biology Portfolio -Inquiry Cubes -She Turned me into a Newt. -Storytelling Graphing -Crossed Knives -The Distraction Stick -Case Study -Investigating Plant Growth. -Scientific Inquiry Assessment *Pill Bug Project -What is Life (parts 1-3). -Potato Bubbles.	<i>The fundamental life processes of plants and animals depend on a variety of chemical reactions that occur in specialized areas of the organism's cells. As a basis for understanding this concept:</i> a. Students know cells are enclosed within semi permeable membranes that regulate their interaction with their surroundings. b. Students know enzymes are proteins that catalyze biochemical reactions without altering the reaction equilibrium and the activities of enzymes depend on the temperature, ionic conditions, and the pH of the surroundings. c. Students know how prokaryotic	9-10.B.1.1.1 Explain the scientific meaning of system, order, and organization. (648.01a) 9-10.B.1.1.2 Apply the concepts of order and organization to a given system. (648.01a) 9-10.B.1.2.1 Use observations and data as evidence on which to base scientific explanations. (648.02a) 9-10.B.1.2.2 Develop models to explain

-Floating Filter Paper Chips.

-Bacon Diffusion

-Osmosis in plants

-Osmosis Inquiry Egg

-Mitosis Sequencing

Vernier Lab Quests

-Lab Quest 02 Limits on Cell Size

-Lab Quest 04

Membrane Diffusion

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Biology Junction:

-Identifying Variables & Controls with Homer

-Vitruvian Man

Scientific Method Worksheet.

-Enzyme Foldable Activity

EXAM 1

cells, eukaryotic cells (including those from plants and animals), and viruses differ in complexity and general structure.

d. Students know the central dogma of molecular biology outlines the flow of information from transcription of ribonucleic acid (RNA) in the nucleus to translation of proteins on ribosomes in the cytoplasm.

e. Students know the role of the endoplasmic reticulum and Golgi apparatus in the secretion of proteins.

f. Students know usable energy is captured from sunlight by chloroplasts and is stored through the synthesis of sugar from carbon dioxide.

g. Students know the role of the mitochondria in making stored chemical-bond energy available to cells by completing the breakdown of glucose to carbon dioxide.

h. Students know most macromolecules (polysaccharides, nucleic acids, proteins, lipids) in cells and organisms are synthesized from a small collection of simple precursors.

i. Students know how chemiosmotic gradients in the mitochondria and chloroplast store energy for ATP production.

j. Students know how eukaryotic cells are given shape and internal organization by a cytoskeleton or cell wall or both.

concepts or systems.

(648.02b)

9-10.B.1.2.2

Develop models

to explain

concepts or

systems.

(648.02b)

9-10.B.1.3.1

Measure changes

that can occur in

and among

systems.

(648.03b)

9-10.B.1.3.2

Analyze changes

that can occur in

and among

systems.

(648.03b)

9-10.B.1.3.3

Measure and

calculate using

the metric system.

(648.03c)

9-10.B.1.6.1

Identify questions

and concepts that

guide scientific

investigations.

(649.01a)

9-10.B.1.6.2

Utilize the

components of

scientific problem

solving to design,

conduct, and

communicate

results of

investigations.

(649.01b)

9-10.B.1.6.3

Use

appropriate

technology and

mathematics to

make

investigations.

(649.01c)

9-10.B.1.6.4

Formulate

scientific

explanations and

models using

logic and

evidence.

(649.01d)

9-10.B.1.6.5

Analyze

alternative

explanations and

			<p>models. (649.01e)</p> <p>9-10.B.1.6.6 Communicate and defend a scientific argument. (649.01f)</p> <p>9-10.B.1.6.7 Explain the differences among observations, hypotheses, and theories. (649.01g)</p> <p>9-10.B.1.8.1 Analyze technical writing, graphs, charts, and diagrams. (658.02a)</p> <p>9-10.B.3.3.1 Identify the particular structures that underlie the cellular functions. (651.01a)</p> <p>9-10.B.3.3.2 Explain cell functions involving chemical reactions. (651.01b)</p> <p>9-10.B.5.2.1 Explain how science advances technology. (655.01a)</p> <p>9-10.B.5.2.2 Explain how technology advances science. (655.01a)</p> <p>9-10.B.5.2.3 Explain how science and technology are pursued for different purposes. (656.01b)</p>
2nd Quarter Topics			
Meiosis DNA & Genetics	<p><u>Biology Inquiries (Chapter 4):</u></p> <p>-Mendel's Data</p> <p>-Multifactorial</p>	<p><i>Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this</i></p>	<p>9-10.B.3.1.2 Explain how evolution is the consequence of interactions</p>

Inheritance

- Nature vs. Nurture
- Chargraff's DNA data
- Classifying Oaks with DNA

Biology Junction:

- Sponge Bob Genetics
- Complete and Incomplete Dominance Problems
- The Blue People of Kentucky.
- Strawberry DNA Lab

EXAM 2

concept:

- a. Students know meiosis is an early step in sexual reproduction in which the pairs of chromosomes separate and segregate randomly during cell division to produce gametes containing one chromosome of each type.
- b. Students know only certain cells in a multicellular organism undergo meiosis.
- c. Students know how random chromosome segregation explains the probability that a particular allele will be in a gamete.
- d. Students know new combinations of alleles may be generated in a zygote through the fusion of male and female gametes (fertilization).
- e. Students know why approximately half of an individual's DNA sequence comes from each parent.
- f. Students know the role of chromosomes in determining an individual's sex.
- g. Students know how to predict possible combinations of alleles in a zygote from the genetic makeup of the parents.

A multicellular organism develops from a single zygote, and its phenotype depends on its genotype, which is established at fertilization. As a basis for understanding this concept:

- a. Students know how to predict the probable outcome of phenotypes in a genetic cross from the genotypes of the parents and mode of inheritance (autosomal or X-linked, dominant or recessive).
- b. Students know the genetic basis for Mendel's laws of segregation and independent assortment.
- c. Students know how to predict the probable mode of inheritance from

among the potential of a species to increase its numbers, genetic variability, a finite supply of resources, and the selection by the environment of those offspring better able to survive and reproduce. (652.01a)
9-10.B.3.3.3 Explain how cells use DNA to store and use information for cell functions. (651.01c)
9-10.B.3.3.4 Explain how selective expression of genes can produce specialized cells from a single cell. (651.01e)

a pedigree diagram showing phenotypes.

d. Students know how to use data on frequency of recombination at meiosis to estimate genetic distances between loci and to interpret genetic maps of chromosomes.

Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism. As a basis for understanding this concept:

a. Students know the general pathway by which ribosomes synthesize proteins, using tRNAs to translate genetic information in mRNA.

b. Students know how to apply the genetic coding rules to predict the sequence of amino acids from a sequence of codons in RNA.

c. Students know how mutations in the DNA sequence of a gene may or may not affect the expression of the gene or the sequence of amino acids in an encoded protein.

d. Students know specialization of cells in multicellular organisms is usually due to different patterns of gene expression rather than to differences of the genes themselves.

e. Students know proteins can differ from one another in the number and sequence of amino acids.

f. Students know why proteins having different amino acid sequences typically have different shapes and chemical properties.

The genetic composition of cells can be altered by incorporation of exogenous DNA into the cells. As a basis for understanding this concept:

a. Students know the general structures and functions of DNA,

		<p>RNA, and protein.</p> <p>b. Students know how to apply base-pairing rules to explain precise copying of DNA during semi conservative replication and transcription of information from DNA into mRNA.</p> <p>c. Students know how genetic engineering (biotechnology) is used to produce novel biomedical and agricultural products.</p> <p>d. Students know how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, ligation, and transformation) is used to construct recombinant DNA molecules.</p> <p>e. Students know how exogenous DNA can be inserted into bacterial cells to alter their genetic makeup and support expression of new protein products.</p>	
<p>3rd Quarter Topics -Matter, Energy, & Organization in Living Systems. - Interdependence of Organisms -Behavior of Organisms</p>	<p><u>Biology Inquiries (Chapters 5-8):</u> -Why are plants green? -Why are plants not always green? -Autotroph Inquiries -Cold Blooded Thermometers. -Energy Storage Molecules & Natural Selection. -Life or Death Food Chain Decision. -Investigating Forest Succession. -History of Carbon -Termite Trails Mystery. -Red Dot Special -The Mozart Effect <u>Vernier Lab Quests:</u> -Lab Quest 15: Biodiversity.</p> <p>EXAM 3</p>	<p><i>Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:</i></p> <p>a. Students know biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.</p> <p>b. Students know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size.</p> <p>c. Students know how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death.</p> <p>d. Students know how water, carbon, and nitrogen cycle between abiotic resources and organic matter in the ecosystem and how oxygen cycles through photosynthesis and respiration.</p> <p>e. Students know a vital part of an ecosystem is the stability of its</p>	<p>9-10.B.3.2.1 Explain how matter tends toward more disorganized states (entropy). (653.01a)</p> <p>9-10.B.3.2.2 Explain how organisms use the continuous input of energy and matter to maintain their chemical and physical organization. (653.01b)</p> <p>9-10.B.3.2.3 Show how the energy for life is primarily derived from the sun through photosynthesis. (653.01c)</p> <p>9-10.B.3.2.4 Describe cellular respiration and the synthesis of macromolecules. (653.01d)</p> <p>9-10.B.3.2.5 Show how matter</p>

		<p>producers and decomposers.</p> <p>f. Students know at each link in a food web some energy is stored in newly made structures but much energy is dissipated into the environment as heat. This dissipation may be represented in an energy pyramid.</p> <p>g. Students know how to distinguish between the accommodation of an individual organism to its environment and the gradual adaptation of a lineage of organisms through genetic change.</p>	<p>cycles and energy flows through the different levels of organization of living systems (cells, organs, organisms, communities) and their environment. (653.01h)</p> <p>9-10.B.5.1.1 Analyze environmental issues such as water and air quality, hazardous waste, forest health, and agricultural production. (656.01a)</p> <p>9-10.B.5.3.1 Describe the difference between renewable and nonrenewable resources. (656.03a)</p>
<p>4th Quarter Topics:</p> <ul style="list-style-type: none"> -Taxonomy -Classification -Evolution -Dissections 	<p>Biology Inquiries:</p> <ul style="list-style-type: none"> -The Lost World -Are Humans Still evolving -Evolutionary Debate -Dissecting Frog Evolution <p>Dissections:</p> <p>Worm, Grasshopper, Crayfish, Squid, Frog, and Dogfish?</p> <p>EXAM 4</p>	<p>The frequency of an allele in a gene pool of a population depends on many factors and may be stable or unstable over time. As a basis for understanding this concept:</p> <p>a. Students know why natural selection acts on the phenotype rather than the genotype of an organism.</p> <p>b. Students know why alleles that are lethal in a homozygous individual may be carried in a heterozygote and thus maintained in a gene pool.</p> <p>c. Students know new mutations are constantly being generated in a gene pool.</p> <p>d. Students know variation within a species increases the likelihood that at least some members of a species will survive under changed environmental conditions.</p> <p>e. Students know the conditions for</p>	<p>9-10.B.3.1.1 Use the theory of evolution to explain how species change over time. (652.01a)</p> <p>-10.B.3.1.2 Explain how evolution is the consequence of interactions among the potential of a species to increase its numbers, genetic variability, a finite supply of resources, and the selection by the environment of those offspring better able to survive and reproduce. (652.01a)</p>

Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature.

f. Students know how to solve the Hardy-Weinberg equation to predict the frequency of genotypes in a population, given the frequency of phenotypes.

Evolution is the result of genetic changes that occur in constantly changing environments.

As a basis for understanding this concept:

a. Students know how natural selection determines the differential survival of groups of organisms.

b. Students know a great diversity of species increases the chance that at least some organisms survive major changes in the environment.

c. Students know the effects of genetic drift on the diversity of organisms in a population.

d. Students know reproductive or geographic isolation affects speciation.

e. Students know how to analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction.

f. Students know how to use comparative embryology, DNA or protein sequence comparisons, and other independent sources of data to create a branching diagram (cladogram) that shows probable evolutionary relationships.

g. Students know how several independent molecular clocks, calibrated against each other and combined with evidence from the fossil record, can help to estimate how long ago various groups of organisms diverged evolutionarily from one another.

12. Grading Policy:

- a. Grades will be weighted based on the following categories:
 - i. **Labs/Activities/Projects: 40%**
 - ii. **Exams/Tests: 40%**
 - iii. **Portfolio/Homework/Quizzes: 20%**
- b. Absolutely no late work will be accepted past the assignment due dates.
- c. Students must pass class with a C or higher to receive credit for class. Please refer to the following grading scale: For both middle school and high school transcripts, grades are dependent on semesters, not quarters. Quarters are essentially a progress report grade for the semester. VCS will continue to give quarter grades, but the semester grades will be based on the entire points for the semester instead of an average of the two quarter grades.

**4.0 Scale
Percentage Letter Scale**

Grade Value
100-98 A+ 4.0
97-94 A 4.0
93-90 A- 3.67
89-87 B+ 3.33
86-84 B 3.0
83-80 B- 2.67
79-77 C+ 2.33
76-74 C 2.0
73-70 C- 1.67
69-67 D+ 1.33
67-60 D 1.0
59-0 F 0.0

13. Course Policies:

- a. **Assignments:** all assignments are due at the beginning of the period on the assignment due date. Assignments must be completed in pencil or ink (if an assignment is turned in otherwise, it won't be accepted) and all questions must be answered in complete sentences. It is the student's responsibility to turn their assignment into the in-box during the first 5 minutes of class (unless we are grading the assignment in class that day). An assignment will be considered late, if it is turned in beyond this time.
- b. **Late Work:** Unexcused late work will NOT be accepted. Unexcused late work will be an automatic zero.
- c. **Make-up work (due to excused absences):** It is the student's responsibility to check their class folder and check with the teacher concerning any make-up work following an excused absence. This should be done before or after school, during nutrition break, or at the beginning of lunch. All labs and exams must be made up at school during a time scheduled by the teacher and the student. Students will have two calendar days for an excused absence to make up work. (For example, if a student is absent Thursday, they will request their make-up work on Friday and the work will be due Tuesday. It is the student's responsibility to request make-up work. For a pre-arranged absence, make-up work will be requested from the teacher before the absence. When a student has had

an excused absence for three consecutive days, the parent may request make-up work be sent to the office for pick up. Requested work will be available the next school day by 3:30 pm. This should be done before or after school, during nutrition break, or at the beginning of lunch. All labs and exams must be made up at school during a time scheduled by the teacher and the student.

- d. **Attendance & Tardiness:** Students who miss more than 6 days during a semester will not receive credit for the class even if they held a passing grade prior to the absences (please refer to the VCS handbook for more detail). ***A student is considered tardy if they are not in their seat and started on their Science Journal when class begins.*** All bathroom and water breaks must be taken in between classes.

14. **Class Guidelines or Procedures:** These are the guidelines that will govern the way we do things in my class.

- i. Respect your teacher, your classmates, the class environment, and yourself.
- ii. Do not talk while the teacher is talking or another student is sharing information with the class.
- iii. When I want your attention I will raise my hand. You will raise your hand, stop what you are doing, and put your eyes on me.
- iv. Don't compare yourself to others, do your best and take pride in your work.
- v. Have fun, but never at the expense of others.

15. **Consequences for not following classroom procedures:**

- a. First student will be warned privately.
- b. Second students will be removed from class for the day and will need to make up the time wasted either through extra physical activity or giving up their lunchtime to serve detention.
- c. Third, student's parents will be contacted for possible conference and behavioral plan.
- d. Fourth, Students will receive discipline referral (loss of school socials, zero for the day, and meeting with administrator) which might include community service hours or possible suspension.

*This Syllabus is your roadmap for this school year, please print a copy and do not lose it. Your first assignment this year is to review the syllabus with your parent(s) or guardian and both parties need to sign stating that they understand and agree to the information presented here in the syllabus. Let's make this an amazing year. Please fill out the following information, sign, detach, and return to your student's teacher.

Student Name: _____

Parent/Guardian Name: _____

Contact information: (phone) _____ (email) _____

Student Signature: _____ Date: _____

Parent/Guardian Signature: _____ Date: _____