High School Course Description for **SDC Biology**

Course Title: SDC Biology

Course Number: SDC207/208

Grade Level: 10-12

Curricular Area: Science

Length: One year

Prerequisites: Passing grade in Integrated Physical Science.

Meets a UC a-g Requirement: No

Meets NCAA Requirement: No

Meets High School Graduation Requirement for:
Biological Science

Course Description
This course introduces SDC students to biological science. Through inquiry, reading, lecture, and lab work, students will come to understand that all life is composed of a web of interdependence with both the biotic and the abiotic world; that all life has developed through a continuous and unbroken pattern that is both stable and random, and that physical events have influenced the speed and direction of this development, and continue to do so today. The course is specifically designed to serve the needs of SDC students.

This course is aligned to the California Content Standards for Science.

Instructional Materials

Required Textbook(s)

- *Biology*. Kenneth Miller and Joseph Levine. Pearson/Prentice Hall 2006. ISBN- 13# 9780132013529.

Supplemental Materials

- Photo manual dissection of The frog and fetal pig

DVD/Videos

- Eyewitness videos
- NOVA
- Nature
- Lorenzo's oil
- PBS videos/DVD's

Exit Criteria

Activities	Percentage
Laboratory/Class Activities	40%
Assessment	40%
Homework	20%
Total:	100%

Development Team:
This Course of Study was updated in May 2009 by Richard Hall and Ben Kundert

SEMESTER ONE

First Quarter		
Weeks	**Standards**	**Unit/Chapter(s)**
1-2	*Investigation and Experimentation*	Intro to Biology: ch. 1-2
3-4	*Cell Biology*	Matter: ch. 2
5-8	*Ecology*	Energy & Ecosystems: ch. 3-5

Second Quarter		
Weeks	**Standards**	**Unit/Chapter(s)**
9-11	*Cell Biology*	Cells: ch. 7, 10
12-18	*Genetics*	Genetics: ch. 11-14

SEMESTER TWO

Third Quarter		
Weeks	**Standards**	**Unit/Chapter(s)**
1-4	*Evolution*	Evolution: ch. 15-17
5-8	*Physiology*	Human Body Systems: ch. 35-36

Fourth Quarter		
Weeks	**Standards**	**Unit/Chapter(s)**
9-14	*Physiology*	Human Systems: ch. 36-40
15	---	STAR Testing
16-19	*Ecology*	Species: ch. 30-32

SEMESTER ONE, QUARTER ONE
UNIT ONE: INTRODUCTION TO BIOLOGY — WEEKS 1-2

Standards Covered:

***Investigation and Experimentation*: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop their own questions and perform investigations. Students** will:

- **1-a** Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.
- **1-b.** Identify and communicate sources of unavoidable experimental error.
- **1-c.** Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.
- **1-d.** Formulate explanations by using logic and evidence.
- **1-f.** Distinguish between hypothesis and theory as scientific terms.
- **1-g.** Recognize the usefulness and limitations of models and theories as scientific representations of reality.
- **1-n.** Know that when an observation does not agree with an accepted scientific theory, the observation is sometimes mistaken or fraudulent (e.g., the Piltdown Man fossil or unidentified flying objects) and that the theory is sometimes wrong.

Date	Topic	Reading
	SEPTEMBER	
2	Introductions and class rules	
3	Introduction to biology and themes	Chapter 1
4	Introduction to biology and themes	
5	Studying Life	Chap 1-.3
8	Tools and procedures	Chap 1-.4
9	Using a microscope	Chap 1-.4
10	Chapter 1 quiz	Chap 1-.1-4

UNIT TWO: MATTER — WEEKS 3-4

Standards Covered:

Cell Biology

- **4-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.
- **4-h**. Students know most macromolecules (polysaccharides, nucleic acids, proteins, lipids) in cells and organisms are synthesized from a small collection of simple precursors.

Genetics

- **4-e.** Students know proteins can differ from one another in the number and sequence of amino acids. shapes and chemical properties

Date	Topic	Reading
	SEPTEMBER	
11	Nature of Matter	Chap 2-.1
12	Atoms, elements, and compounds	Chap 2-.1
15	Properties of water	Chap 2-.2
16	Acids and bases lab	Chap 2-.2
17	Carbon compounds	Chap 2-.3
18	Chemistry video	Chap 2-.3
19	Chemical reaction notes/demonstrations	
22		
23	Chemical reactions and enzymes	Chap 2-.4
24	Review chapter 2	Chap 2-.1-4
25	Video on matter/energy	
26	Test chapter 2	

UNIT THREE: ENERGY & ECOSYSTEMS — WEEKS 5-8

Standards Covered

***Ecology*: Stability in an ecosystem is a balance between competing effects.**

- **6-a:** Students know biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.
- **6-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.
- **6-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.
- **6-e:** Students know a vital part of an ecosystem is the stability of its producers and decomposers.
- **6-c:** Students know how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death.
- **6-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.

Date	Topic	Reading
	SEPTEMBER	
26	Test chapter 2	
29	Intro to ecology/biosphere	Chapter 3-1
30	Energy & Ecosystems **(standard 6a & 6f)**	Chap 3-6
	OCTOBER	
1&2	Energy flow &Food chain Activity	Chap 3-2
3	Cycles of matter	Chap 3-3

6	Video on food chains in nature	
7	Food web activity/posters	
8		
9	Quiz on chapter 3	
13	Climate and ecosystems	Chap 4:1-2
14	Video on ecosystems in various climates	
15	Biomes/aquatic ecosystems	Chap 4:3-4
16	Video on aquatic ecosystems	
17	How populations grow	Chap 5:1
20	Limits to population growth	Chap 5:2
21	Predator-prey relationship video	Notes on Predator-prey relationships
22		
23	Human population growth	
24	Quiz on chapter 5	Chap 5:1-3

SEMESTER ONE, QUARTER TWO — WEEKS 1-10

Standards Covered

***Cell Biology*: The fundamental life processes of plants and animals depend on variety of chemical reactions that occur in specialized areas of the organism's cells.**

- **1-h:** Students know most macromolecules in cells and organisms are synthesized from a small collection of simple precursors.
- **1-c:** Students know how prokaryotic cells, eukaryotic cells (plants and animals), and viruses differ in complexity and general structure.
- **1-d:** Students know the central dogma of molecular biology outlines the flow of information from transcription of RNA in the nucleus to the translation of proteins on ribosomes in the cytoplasm.
- **1-e:** Students know the role of the ER and Golgi apparatus in the secretion of proteins.
- **1-a:** Students know cells are enclosed within semi permeable membranes that regulate their interaction with their surroundings.
- **1-f:** Students know usable energy is captured from sunlight by chloroplasts and is stored through the synthesis of sugar from carbon dioxide.

Date	Topic	Reading
	OCTOBER	
27	Cells and the cell theory	Chap 7:1
28	Eukaryotic cell structure and function	Chap 7:2
29	Notes on cell organelles/functions	
30	Video on cells	
31	Cell Drawings/labeling plant cell	

NOVEMBER		
3	Cell Drawings/labeling animal cell	
4	Cell membrane & control of their environment	Chap 7:3(standard 1a)
5	Cell groupings (tissues, organs, organ systems	Chap 7:4
6	Lab on cells and the microscope	
7	Video on cell functions/diversity	
10	Review chapter 7	
12	Test chap. 7	Chap 7:1-4
13	Regulating the cell cycle	Chap 10:3
14	Cancer and stem cell research	Chap 10:3
17	Notes on cancer/ stem cell research	

UNIT FIVE: GENETICS — WEEKS 12-18

Standards Covered"

Genetics: **Mutation and sexual reproduction lead to genetic variation in a population.**

- **2-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.
- **2-b:** Students know only certain cells in a multicellular organism undergo meiosis.
- **2-c:** Students know how random chromosome segregation explains the probability that a particular allele will be in a gamete.
- **2-d:** Students know new combinations of alleles may be generated in a zygote through the fusion of male and female gametes (fertilization).
- **2-e:** Students know why approximately half of an individual's DNA sequence comes from each parent.
- **2-f:** Students know the role of chromosomes in determining an individual's sex.

Genetics: **A multicellular organism develops from a single zygote, and its phenotype depends on its genotype, which is established at fertilization.**

- **3-b:** Students know the genetic basis for Mendel's laws of segregation and independent assortment.
- **3-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).

Genetics: **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.**

The genetic composition of cells can be altered by incorporation of exogenous DNA into the cells.

- **5-a:** Students know the general structures and functions of DNA, RNA, and protein.
- **5-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.
- **4-b:** Students know how to apply the genetic coding rules to predict the sequence of amino acids from a sequence of codons in RNA.
- **4-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.
- **5-c:** Students know how genetic engineering (biotechnology) is used to produce novel biomedical and agricultural products.

Date	Topic	Reading	Standards Covered
18	Introduction to genetics	Chap 11:1	
19	Notes: traits, hybrids, genes, alleles	Principle of dominance, & segregation	(standard 3b)
20	Punnett squares	Chap 11:2	
21	Independent assortment, multiple alleles	Chap 11:3	(standard 3a)
29	Meiosis & sexual reproduction	Chap 11:4-5	(standards 2a 2g)
DECEMBER			
1	Human heredity, genetic disorders	Chap 14:1	
2	Genetics Problems		
3	Using a pedigree		
4	Analyzing Pedigrees		(standard 3c)
5	Human chromosome disorders	Chap 14:2	
8 **10**	Human Karyotype Labs		
11	Human gene therapy	Chap 14:3	
12	Human DNA analysis	Chap 14:3	(standards 3a - 3c)
15	Genetics Lab		
16 **17** **18**	Movie: *Lorenzo's Oil*		
19	Quiz on human genetics	Chap 14:1-3	
JANUARY			
5	Structure of DNA,	Chap 12:1	(standards 5a & 4e)
6	Video: The double helix		
7	Chromosomes and DNA replication	Chap 12:2	
8 **9**	DNA fingerprinting/forensics Notes on DNA structure and replication	Chap 12:1-2	
12	Transcription, translation & gene regulation	Chap 12:3	(standards 5b, 4a, 4b, & 4d)
13 **14**	Notes on DNA protein synthesis Mutations and gene regulation (standard 4c)	Chap 12:4-5	
15 **16**	Genetic engineering Genetic engineering & Society	Chap 13:1-2	(standard 5c)
20	Transcription, translation of DNA lab		
21	Genetic engineering	Chap 13:3-4	
22	Genetic engineering lab		

23	GATTACA video		
26	GATTACA video		
27	Finals-------minimum day		
28	Finals-------minimum day		
29	Finals-------minimum day		
30	No students: end of 1st semester		

UNIT SIX: EVOLUTION — WEEKS 1-4

Standards Covered

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

- **8-a:** Students know how natural selection determines the differential survival of groups of organisms.
- **8-b:** Students know a great diversity of species increases the chance that at least some organisms survive major changes in the environment.
- **8-c:** Students know the effects of genetic drift on the diversity of organisms in a population.
- **8-d:** Students know reproductive or geographic isolation affects speciation.
- **8-e:** Students know how to analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction.

The frequency of an allele in a gene pool of a population depends on many factors and may be stable or unstable over time.

- **7-d:** Students know variation within a species increases the likelihood that at least some members of a species will survive under changed environmental conditions.
- **7-c:** Students know new mutations are constantly being generated in a gene pool.
- **7-a:** Students know why natural selection acts on the phenotype rather than the genotype of an organism.
- **7-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.

Date	Topic	Reading
	FEBRUARY	
2	Introduction to Evolution Darwins voyage	Chapter 15.1
3	Outline of evolution notes	
4	Evidence for Evolution	Chapter 15.2
5	Video	
6	Survival of the fittest	Chapter 15.3
10	Mechanisms for Evolutionary change: gene pools and variation, polygenic traits	Chapter 16.1
11	(standards 7d & 7c)	
12	Evolution & Natural Selection (standard 8a) As genetic change force.	Chapter 16.2

13 **17**	Evolution & the Diversity of Species, Genetic Drift, and Speciation (standard 8b, 8c, & 8d)	Chapter 16.3
18	Speciation	Natural Selection & Genetic Drift Lab
19	Evidence for Evolution (standard 8e)Fossil records.	Chapter 17.1
20	How Life Began Video	
23	Early EARTH history	Chapter 17.2
24	Patterns of evolution (punctuated equilibrium)	Chapter 17.3-4
25	Chapter 15-17 Test)	

UNIT SEVEN: PHYSIOLOGY—HUMAN BODY SYSTEMS WEEKS 5-14

Standards Covered:

Physiology: **As a result of the coordinated structures and functions of organ systems, the internal environment of the human body remains relatively stable (homeostatic) despite changes in the outside environment.**

- **9-a:** Students know how the complementary activity of major body systems provides cells with oxygen and nutrients and removes toxic waste products such as carbon dioxide.
- **9-d:** Students know the functions of the nervous system and the role of neurons in transmitting electrochemical impulses.
- **9-b:** Students know how the nervous system mediates communication between different parts of the body and the body's interactions with the environment.
- **9-c:** Students know how feedback loops regulate conditions in the body.

Physiology: **Organisms have a variety of mechanisms to combat disease.**

- **10-d:** Students know there are important differences between bacteria and viruses with respect to their requirements for growth and replication, the body's primary defenses against bacterial and viral infections, and effective treatment of these infections.
- **10-a:** Students know the role of the skin in providing nonspecific defenses against infection.
- **10-b:** Students know the role of antibodies in the body's response to infection.
- **10-c:** Students know how vaccination protects an individual from infectious diseases.
- **10-e**: Students know why an individual with a compromised immune system (AIDS) may be unable to fight off and survive infections by microorganisms that are usually benign.

Date	Topic	Reading
FEBRUARY		
26	Human body systems	Chapter 35:1
27	Video: Incredible Human Machine	
MARCH		
2	Human Nervous system	Chapter 35:2

3 **4**	Neurons and the synapse notes/parts of the nerve cell.	
5	Divisions of the nervous system	Chapter 35:3
6	The brain video	
9	The senses	Chapter 35:4
10	Optical illusions, blind spot lab	
11	Drugs and the nervous system	Chapter 35:5
12	Video: Illegal drugs	
16	Notes on narcotics/	
17	Notes on hallucinogens	
18	Handout: Drugs and the nervous system	
19	Alcohol and Nicotine notes	
20	Marijuana handout	
23	Skeletal system	Chapter 36:1
24	Notes on fractures and broken bones	
25	Bone notes	
26	Muscular system	Chapter 36:2
27	Anabolic steroids notes	
APRIL		
6	Skin system	Chapter 36:3
7	Pimples handout	
8	Circulatory system	Chapter 37:1
9	Video: heart attacks/strokes	
10	Blood and lymphatic system	Chapter 37:2
13	Notes on blood/circulation	
14	Respiratory system	Chapter 37:3
15	Asthma/ emphysema	
16 **17**	Review chap. 36 & 37	
20	Test on 36 & 37	
21	Food and Nutrition	Chapter 38:1
22	My Pyramid notes on diet.	
23	Analysis: Evaluating food labels	
24	Process of digestion	Chapter 38:2
27	Excretory system	
28	Review excretory system	
29	Endocrine system/ Human Endocrine system	Chapter 39:1-2
30	Hormone notes	

MAY		
4	Reproductive system	Chapter 39:3
5	Video; Miracle of Life	
6	Fertilization and development	Chapter 39:4
7	Video: 18 ways to make a baby (IVF)	
8	Review 39:1-4	
11	Test Chapter 39:1-4	
12	Infectious disease/Immune sytstem	Chapter 40:1-2
13	Video: Typhoid Mary	
14	Immune Sytem disorders	Chapter 40:3
15	Environment and Health	Chapter 40:4
18	AIDS video	
19	**STAR TESTING?**	
20		
21		
22		

UNIT EIGHT: SPECIES — WEEKS 16-19

Standards

Ecology: **Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:**

- **6-a** Students know biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.
- **6-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.
- **6-c.** Students know how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death

Evolution: **Evolution is the result of genetic changes that occur in constantly changing environments. As a basis for understanding this concept:**

- **8-a.** Students know how natural selection determines the differential survival of groups of organisms.
- **8-b.** Students know a great diversity of species increases the chance that at least some organisms survive major changes in the environment.
- **8-e.** Students know how to analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction.

Date	Topic	Reading
MAY		
26	Fish and how they evolved	Chapter 30:2.
27	Video on fish/shark evolution	
28	Amphibians	Chapter 30.3

29	Reptiles	Chapter 31:1
JUNE		
1	Dinosaurs video	
2	Crocodiles/alligators	Chapter 31:2
3	Video on crocodiles/ alligators	
4	Intro to mammals/diversity in mammals	Chapter 32:1-2
5	Mammal Video: Grizzly bears	
8	Pig dissection lab	
9	Pig dissection lab	
10	**Review for Final**	
11		
12		
15		
	2nd Semester Finals (minimum days)	

Learning Experiences and Instruction:
Teachers utilize the Direct Interactive Instruction model to introduce new skills and concepts that are essential to the Science and CAHSEE standards with an emphasis on individual differentiation as needed.

Teachers will use a variety of the following:

- Inquiry-based learning
- Engaged reading opportunities
- Think-pair-share
- Reciprocal teaching
- Cloze reading & writing
- Guided reading & writing
- Cognitive modeling
- Questioning strategies
- Graphic organizers/concept attainment
- Student-led groups/ peer pairing
- Metacognitive learning: self-regulation, goal-setting, self-monitoring, and self-questioning

Support for English Language Learners:
SDAIE strategies
Flexible grouping
Peer pairing
Realia
Texts/materials in first language
Instructional Aide

Support for Special Education Students:
As this is an SDC class, it is designed to meet the needs of the class and of individuals. All students' IEP goals and accommodations will be addressed using a combination of the following:

- Instructional Aide
- Audio & visual aids
- Modified texts (supplementary materials)
- Flexible grouping
- Testing accommodations
- Tutoring (peer & teacher)
- Computer-Guided instruction
- Individualized academic instruction
- Modified assignments