Biology/Biotechnology Course Guide

San Marin High School

2015-2016

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**Description/Course Goals**

Biology/Biotechnology is a lab oriented, concept building course that covers the four high school life science standards; Structure and Processes of molecules through organisms; Matter and Energy in organisms and ecosystems; Ecosystems interactions, energy and dynamics; Heredity; and Biological evolution. Students will master concepts through projects and labs, literature research, presentations and discussion. Students will learn and use basic laboratory skills and techniques used in the Biotechnology field to study DNA and proteins and genetically engineer DNA and organisms to produce products useful to humans and use design and engineering software to design and build working models of organelles and organs. The course will meet the Next Generation Science Standards for High School Life Science and integrate Biotechnology and Engineering principles and practices in to the curriculum.

**Course Objectives/General Topics of Study**

The curriculum is based on the California State Standards for HS-LS1-4. Students will be able to investigate explanations for the structure and function of cell, tissues and systems in organisms and demonstrate an understanding of how systems function together to support life processes. Students will demonstrate understanding between the relationship between DNA and chromosomes and cell division and inheritance of traits and use statistical models to explain variation within populations. Students will be able to explain mechanisms of inheritance, gene mutations and gene expression and consider bioethical issues related to these topics. Students will be able to explain the role of cycling of energy and matter in organisms and ecosystems and develop evidence to support explanations of the interactions between photosynthesis and cellular respiration, understand how organisms obtain and utilize resources and change their environments. Students can relate the nature of science to how explanations change in light of new evidence. Students will develop the ability to investigate the role of biodiversity in ecosystems and the role of animal behavior on survival and have an increased understanding about how interactions between organisms sustain ecosystems. Students can apply scientific reasoning to link evidence to changes in ecosystems. Students will investigate patterns to find relationships between the environment and natural selection, understand and explain processes that cause natural selection and understand how multiple lines of evidence can build scientific theories, and apply mathematical concepts and models to explain evolution. For access to the full text of the standards, go to **www.nusd.org.**

## Texts and supplemental instructional materials

Biology by Miller and Levine

Biotechnology: Science for the New Millennium by Ellen Daugherty

Biotechnology Laboratory Manual by Ellen Daugherty

**Progress Reporting**

Grades shall be reported at the end of each progress reporting period and will be available online. Online grading will be updated weekly throughout the semester

**Classroom Policies**

**Grading**

Current topics presentations 20%

Quizzes and Tests 30%

Labs and projects 50%

Accumulated points from the above assessments will be evaluated as follows:

90-100% A

80-89% B

70-79% C

60-69% D

Below 60% F

**Tardiness and Absences**

I follow the school tardy and absences policies.

**Homework/Journal and Lab notebook updates**

Homework will be posted on the white board, website and the class calendar. Homework is due at the beginning of class

**Quizzes and Tests**

There will be a quiz on each chapter, a midterm and a final

**Make up work**

Only work missed by excused absences will be allowed to be made up. All assignments are due on the day of return to school unless you contact me first and make alternative arrangements (my discretion). Lab and write ups must be made up within 5 days of return to school.

Late work will be accepted for credit as follows: Within 1 day of the assignment due date for 10% reduction in credit; within 2 days for 20% reduction, within 1week of assignment due date for 30% reduction, after 1 week 50% reduction.

#### Cheating- Science involves the pursuit of truth and knowledge. Practicing academic and intellectual integrity is just as important in the high school science classroom as it is in the real world. I don’t respect cheaters and will not tolerate cheating in my classroom. This includes copying lab write ups and homework. For a first offense the involved parties will each receive an F on the assignment and a formal write up. The second offense will result in failure of the class. Cooperative work is OK and encouraged.

**Cell phones-if used in class will be confiscated until the end of the day (2:45)**. Second offense results in a referral and detention and your parent or guardian coming in after school to pick up the phone from me.

**Instructional methods and strategies**

Labs, class discussions, homework, research reports, lectures, quizzes, group work, tests, oral presentations, computer research, computer tutorials, model design and building, note taking, memorization and review games

**Tutoring and other help**

I am available during lunch and after school by appointment

**Materials**

Binder and paper

Bound lab notebook with graph paper

Black pen

Pencils

Metric ruler

Scientific calculator (like a TX 30) with functions for exponents, scientific notation and logs

**Tentative Schedule**

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| --- | --- | --- | --- |
| **Week** | **Lesson Focus** | **Standards and Chapters** | **Methods** |
| 1-7 | Evolution | HS-LS3a-b.HS-LS4a-c,  Miller and Levine Ch 15-18,29,33 | Readings: Origin of Species. Selfish Gene, Greatest Show on Earth, Stephen J Gould, etc  Presentations and papers: Current topics Evolution and human diseases  Lecture notes  Evolution discussions  Dissection Labs  Field trip: TBD  Guest speaker: TBD |
| 8-15 | Ecology | HS-LS2a-c  Miller and Levine Ch 3-6  Biotechnology text Ch 6  Biotechnology Labs Natural Product Discovery, 12a-e | Readings: current topics articles in Ecology  Presentations and papers: Current topics, Field Study results  Lecture notes  Field Study and Habitat garden projects  Labs-Natural product development, Genetically modified organisms  Guest speaker: TBD  Field trip: TBD |
| 16-21 | The human body | HS-LS 1a-b  Miller and Levine Ch 35-40  Biotechnology Labs13 e-g | Readings: current topics articles human health  Presentations and papers: Current topics  Lecture notes  Model design and building  Physiology Labs  Model presentations and demonstrations |
| 22-28 | Introduction to genetics and the human genome, genetic engineering, bioethics, bacteria and viruses, protists, fungi, sponged and cnidarians, worms and mollusks, arthropods and echinoderms, chordates, fish and amphibians, reptiles and birds, mammals, comparative anatomy and animal behavior | HS-LS 1a-b, HS-LS3a-b  Miller and Levine Ch 12-14, 19-34  Biotechnology Labs 4a-b,4e-j, , 8a-b, pglo transformation and purification  Biotechnology text Ch 1,8 | Readings: Dark Lady of DNA, Immortal Life, current topics articles  Presentations and papers: Current topics  Lecture notes  Dissections  Labs  Guest speaker-TBD industry  Forensics project  Field trip-TBD |
| 28-39 | Chemistry of life, cell structure and function, photosynthesis, cellular respiration, cell growth and division, DNA, RNA and genetic engineering, bioethics | HS-LS1a-c  Miller and Levine Ch 1-2,7-10  Biotechnology Labs 2a-e, 3d-h  Biotechnology text Ch 1,8 | Readings: Dark Lady of DNA, Immortal Life current topics articles  Presentations and papers: Current topics  Lecture notes  Biochemistry model kits  Labs-transformation, protein purification, cell dissection  Guest speaker-Stem cells  Edible cell models  Bioethics discussions |

**Please sign and return this by Friday August 24**

**I have read and understand the course outline and classroom policies**

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Student

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Parent or Guardian