Biology

2007 - 2008

Brief Description of Course

The course, AP Biology is very demanding. What helps most is focusing on the overriding concepts rather than the isolated details [C4]. In doing so, the course begins to tell a story; the story of life. This course meets every day. Alternating between "A days" and "B days", we either have a single period that spans 40 minutes or double period that spans 83 minutes (hallway passing time is included in class time on double period days). Course content is delivered with a variety of teaching strategies. They include lectures that are guided by PowerPoint presentations, Socratic discussions, cooperative work, hands-on inquiry (labs), independent studies guided by project assignment, computer animations via the internet or the CD ROM that accompanies the text, streaming video and peer evaluation. Tutorial is offered on a daily basis during mutually free periods throughout the day or after school. Seeing that I teach other science courses and offer tutorials to the students of these courses as well, I ask that you make and confirm an appointment with me. As a responsible and self motivated student, I ask that you be prepared with questions. Time during tutorial is not meant to replace class time; its intent is to complement it and root out any misconceptions. Lab work is a critical component of this course. At minimum, it will comprise 25% of out time. This includes homework to prepare for the lab, pre-lab discussions, hands-on experimentation, post-lab discussion and preparation of a formal lab report that includes the following: - Title Page (Completed prior to day of experimentation) - Introduction and Background with Hypothesis (Completed prior to day of experimentation) - List of Materials (Completed prior to day of experimentation) - Procedures (Completed prior to day of experimentation) - Results - Analysis - Discussion and Conclusion - Reasons for Error and Future Recommendations Lab reports will be placed in a separate notebook dedicated to labs. This book will be collected and graded one week after the conclusion. During experimentation, I reserve the right to evaluate students independent pre-lab preparation by inspecting their lab books for the above mentioned requirements for formal lab reports. Exams are structured to prepare students for the AP Biology exam in May. They include multiple choice questions gleaned from the text and past AP essay questions. The grade structure is as follows: - Exams & Quizzes 50% - Labs & Lab Reports 25% - Homework 15% - Class work & Participation 10%

Unit Information

Unit Name or Timeframe:
The Chemistry of life

Content and/or Skills Taught:
Structure of an atom
Types of chemical bonding
Functional groups
Classification and formation of macromolecules
Characteristics of enzymes
Water
Energy
C1 & C8

Major Assignments and/or Assessments:
LAB:
Enzyme Catalysis Activity
Students complete AP Lab 2, Enzyme Catalysis.
Properties of Water
How many drops of water can fit on a penny? We also do simple demonstrations of capillary action in this teacher-generated lab.

Unit Name or Timeframe:
The Cell

Content and/or Skills Taught:
Cellular Structure and Function
Fluid mosaic model of the plasma membrane
Types of cellular transport
Subcellular organization (Organelle and cytoskeleton structure and function)
Prokaryotic and eukaryotic cells
Metabolism
Free energy changes
Molecules and reactions involved in metabolism
Fermentation and cellular respiration
Light-independent and light-dependent reactions
Communication
External Signals are converted into responses within the cell
Signal molecules cause receptor molecules change shape
Signal alter cytoplamic activities or transcription
Cellular Reproduction
Stages involved in mitosis
Stages involved in meiosis
Alternation of generations
Spermatogenesis and Oogenesis
C1 & C8

Major Assignments and/or Assessments:
LABS:
Diffusion and Osmosis
Students complete AP Lab 1, Diffusion and Osmosis.
Mitosis and Meiosis
Students complete AP Lab 3, Mitosis and Meiosis.
Cell Respiration
Students complete AP Lab 5, "Cell Respiration."
Photosynthesis
Students complete AP Lab 4, Exercise 4B, Photosynthesis/The Light Reaction.
Plant Pigment Chromatography
Students complete AP Lab 4, Exercise 4A, Plant Pigment Chromatography.

Unit Name or Timeframe:
Genetics

Content and/or Skills Taught:
Mendelian genetics, probability, segregation, independent assortment
Non-Mendelian patterns, codominance, pleiotropy, epitasis, polygeny
Human genetics, pedigree analysis
Sex linkage, autosomal linkage, linkage maps
Drosophila genetics, setting up a cross
Chi-square analysis
Eukaryotic chromosome
Control of gene expression, Lac Operon
DNA Technology
C2 & C8

Major Assignments and/or Assessments:
LABS:
Gel Electrophoresis
Students complete AP Lab 6, Molecular Biology.
Karyotyping
Students complete Lab, Karyotyping.
Fruit Fly Lab
Students complete AP Lab 7, Genetics of Organisms. using an alternative approach. Secondary to facility restraints, this lab will be completed virtually using the web site http://www.sciencecourseware.org/vcise/drosophila/ and materials provided by way of a colleague, David Knuffke. In completing the lab in this manner, the learning experience, complete with Chi Square Analysis, is condensed into one eighty minute experience rather than one that is protracted. In addition, the human error inherent in learn how to correctly identify the sexes is eliminated.

Unit Name or Timeframe:
Evolution

Content and/or Skills Taught:
Evidence of evolution
Evolution of populations
Phylogenetic Trees
C2, C5 & C8

Major Assignments and/or Assessments:
LABS:
Hardy-Weinberg Law of Genetic Equilibrium
Students complete AP Lab 8, Population Genetics and Evolution.

Unit Name or Timeframe:
Biological Diversity

Content and/or Skills Taught:
Three Domains, Prokaryote and Eukaryote Diversity and Animal Phylogeny
C3

Major Assignments and/or Assessments:
The corresponding chapters are assigned reading over Spring Break. A packet of questions modified from Kim Foglia is assigned and due when students return.

Unit Name or Timeframe:
Plants

Content and/or Skills Taught:
Angiosperm leaf anatomy
Angiosperm structure and growth
Angiosperm reproduction and growth
Plant control systems
C3 & C8

Major Assignments and/or Assessments:
LABS:
Transpiration
Students complete AP Lab 9, Transpiration. For simplicity, I buy tomato flats and use them rather than growing plants from seeds.

Unit Name or Timeframe:
Animals

Content and/or Skills Taught:
Basic principles of anatomy, with an emphasis on mammalian systems
Digestive system structure and function
Heart and circulatory system
Respiratory system
Immune system
Osmoregulation and the excretory system
Endocrine system: homeostasis, sugar and calcium control, review of sexual hormones
Nervous system: plan of the nervous system, neuron structure, reflex arc, transmission of nerve impulse
Muscular system: voluntary and involuntary muscles, muscular contraction
Review of human reproduction and embryology
C3 & C8

Major Assignments and/or Assessments:
LABS:
Pulse Rates
Students complete AP Lab 10, Exercise 10A, Measuring Blood Pressure, Exercise 10B, A Test of Fitness, and Exercise 10C, "Heart Rate and Temperature", utilizing the following web site for observable data: http://www.phschool.com/science/biology_place/labbench/lab10/concepts2.html.
How Effective is Perspiration in Cooling?
Animal Behavior
Students complete AP Lab 11, Exercise 11A, General Observations of Behaviors, and Exercise 11B, "Reproductive Behavior in Fruit Flies", utilizing the following web site for observable data: http://www.phschool.com/science/biology_place/labbench/lab11/observe.html

Unit Name or Timeframe:
Ecology

Content and/or Skills Taught:
Biomes: aquatic and terrestrial biomes and the factors that influence them
Community ecology, ecological succession, soil and its role in succession
Ecosystem ecology, trophic structure, and productivity

Population ecology
Man's Impact
C3, C7 & C8

Major Assignments and/or Assessments:
LABS:
Dissolved O2
Students complete AP Lab 12, Exercise 12A, Dissolved Oxygen and Temperature.
Thermal Pollution
Owl Pellet Investigation

Textbooks

Title: Biology

Publisher: Prentice Hall College Div

Published Date: 10 December, 2004

Author: Neil A. Campbell

Second Author: Jane B. Reece

Description:

Other Course Materials

Material Type: Audiovisual Materials

Description:
CD ROM that accompanies Campbell 7th Edition

Material Type: Other

Description:

Material Type: Other

Description:
AP* Test Prep workbook for Biology, 7th Edition AP* Edition

Material Type: Other

Description:
"Biology (Cliffs AP)" or "Five Steps to a 5: AP Biology" are recommended for student purchase for the purpose of review

Websites

URL:http://www.sciencecourseware.org/vcise/drosophila/

Description:
Virtual Lab: Genetics - Drosophila

URL:http://www.phschool.com/science/biology_place/labb

Description:
Virtual Labs

URL:http://bio.kimunity.com/ap_biology/

Description:
Incredible resources from an experienced AP Biology teacher. Besides content galore, additional web links by category are hyperlinked.
She has given me permission to utilize her materials.
Thank you Kim.

URL:http://www.pbs.org/wgbh/evolution/library/

Description:
A searchable library of vinetes related to evolution. These are from the program entitled "Evolution".

URL:http://pinker.wjh.harvard.edu/articles/media/2005_

Description:
An on-line periodical from TIME magazine discussing how faith and evolution can coexist. Very interesting for those people that feel torn.

URL:www.drblock.wikispaces.com

Description:
This is my site. I post weekly assignments, announcements, all handouts (Ex: Lecture notes and PowerPoint presentations) and helpful links.

Additional Information

Requirement: Biological concepts: Molecules and Cells

How Course Meets Requirement:
Please see "Unit Information" for details.

Requirement: Biological concepts: Heredity and Evolution.

How Course Meets Requirement:
Please see "Unit Information" for details.

Requirement: Biological concepts: Organisms and Populations.

How Course Meets Requirement:
Please see "Unit Information" for details.

Requirement: Concepts vs. accumulation of facts.

How Course Meets Requirement:
To stress biology and science in general as a process, content is connected across topics and lab activities stress development and testing of the hypothesis; collection, analysis, and presentation of data; and a clear discussion of results. Formal reports are required, and must include the aforementioned elements, plus proper labeling of tables and graphs, and statistical testing is encouraged wherever possible.

Requirement: Concepts emphasizing evolution as the foundation.

How Course Meets Requirement:
Please see "Unit Information" for details.

Requirement: Integration of the eight major themes.

How Course Meets Requirement:
Please see "Unit Information" for details.
Also, content is connected across topics in an effort to develop the "Story of Biology" rather than the memorization of isolated facts.

Requirement: Applications of biological knowledge.

How Course Meets Requirement:
Students truly are the future. As teachers we are charged with the responsibility to cultivate well rounded, productive, thinking members of society; ones that will vote and tackle the issues that are currently upon us and issues we have yet to uncover. In recognition of this, I see my role as a facilitator, not a director of thought. Students are encouraged to explore their own perspective on a host of topics, but challenged to reassess them based on objective findings through the laboratory and works of other scientists. They are also held responsible for conducting themselves as adults and respect the views of others.
Examples include Evolution vs. Intelligent Design, Stem Cell Research, Cloning and Global Warming.

Requirement: The course includes a laboratory component.

How Course Meets Requirement:
Please see "Unit Information" and "Brief Description of Course" for details.