

AP Biology/Honors Research Methods and Techniques

Panther Creek High School

Teacher: Ms. Kathy Wall

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Course Overview

AP Biology is an intensive, fast-paced course designed to meet the requirements of an introductory college level course for first year biology majors. Therefore, students should already possess a strong background from first level biology and chemistry classes. The nature of the discipline alone requires student to read extensively outside of class, use inductive and deductive reasoning when exploring scientific problems, read scientific abstracts and journals, and write scientifically. The topics on the following pages are consistent with the standards set forth by the AP College Board and will prepare you to take the AP Biology Examination in the spring. Because the AP exam requires a student to write 2 timed essays and constructed responses, there will be numerous essays and short answers written throughout the course. Successful students already exhibit a strong ability to write comprehensive essays.

AP Biology is taught "linked" to an honors research methods and techniques course on the 4 x 4 block schedule. Students meet daily for 90 minutes the entire school year.

The textbook for the course is the seventh edition of Neil A. Campbell and Jane B. Reece's **Biology** (New York: Benjamin Cummings, 2002).

Philosophy

Students are actively engaged in their own learning throughout the class. Student presentations and individual and group discussions are common. This high level of student involvement increases their understanding of biological concepts and more importantly helps them recognize the personal and societal relevance of the content. Teacher initiated lectures are used, as needed, to clarify difficult concepts, make transitions from one concept to another, and to elaborate on student discussions.

Panther Creek Basic Expectations:

- Be present and on time.
- Be prepared and engaged in learning.
- Be a person of character.
- Be safe and comply with all PCHS and WCPSS policies.

Tardy Policy: Students are expected to sign the classroom tardy log if they are late to class. Consequences for tardiness: 1st/3rd Tardy Table

2nd/4th

1st – 2nd Offense – Teacher Warning

3rd Offense – Parent contact/warning

4th Offense – Teacher assigned consequence

5th Offense - Administrative Lunch Detention (ALD)

>5 Offenses – ALD/Privilege revocation

Late Work: Late work is reduced by one letter grade (10%) each day that it is late to a maximum 40%. However, if an assignment is not turned in prior to the return of the graded class set, it will not be accepted.

Grading: A=90-100 B=80-89 C=70-79 D=60-69 F=<60

| | <u>Honors Research</u> | <u>AP</u> |
|---|------------------------|-----------|
| Tests (Chapter, Unit Tests and Midterm) | 60% | 70% |
| Labs (Labs, Projects and Lab Tests) | 20% | 25% |
| Classwork (quizzes, homework, etc.) | 15% | |
| Student Engagement | 5% | 5% |
| (Classwork plus student engagement is 5% in the AP portion of the course) | | |
| Final Grade: 1 st Quarter | 40% | |
| 2 nd Quarter | 40% | |
| Final Exam | 20% | |

Students are expected to attend 4 SMART lunch sessions per quarter according to PCHS Policy. Two of these SMART lunch sessions must be completed prior to interim reports and two after. SMART lunch is a great time to form study groups for tests and labs.

SMART Lunch Schedule: Tuesday B and Friday A

Laboratory Requirements

The course requires 13 in-depth AP Inquiry Based Laboratory experiences, as well as, numerous other wet and dry labs that enrich the content of the course while increasing student understanding of major concepts.

Students generally work in groups of three to four to complete these labs.

Groups are responsible for gathering materials, setting up labs, collecting data, preparing stock solutions, culturing the specimen, cleaning up the labs, and possibly beginning parts of labs early. After completion of the labs, individual students will be required to write formal lab reports (“write ups”), complete lab practical, or take written lab tests. Students are encouraged to keep formal lab reports, since colleges/universities may ask to review them.

Below is a tentative Course Outline including topics to be covered. The sequence, in which, these topics are covered and the lab selection is subject to change, due to the discretion of the teacher.

Unifying themes that recur throughout the course include: Science as a Process, Evolution, Energy Transfer, Continuity and Change, Relationship of Structure to Function, Regulation, Interdependence in Nature and Science, Technology and Society.

Outline:

I. Molecules and Cells (25% of course)

A. Chemistry of Life

Water, Organic molecules in organisms, Free energy changes, Enzymes

Chapters 1-3, 4-5, 6(Unit)

AP Lab -Enzymes

B. Cells

Prokaryotic and eukaryotic cells, Membranes, Subcellular organization, Cell cycle and its regulation

Chapters 7-8, 11-12

Cell Size lab, AP Lab -Diffusion and Osmosis, Microscope work, AP Lab -Mitosis

C. Cellular Energy

Coupled reactions, Fermentation and cellular respiration, Photosynthesis

Chapters 9-10

AP Lab -Cell Respiration, AP Lab-Plant Pigments and Photosynthesis

II. Heredity and Evolution (25% of course)

A. Heredity

Meiosis and gametogenesis, Eukaryotic chromosomes, Inheritance patterns

Chapters 13-15

AP Lab -Meiosis, Paper Chromosome Lab

AP Lab -Genetics

B. Molecular Genetics

RNA and DNA structure and function, Gene regulation, Mutation, Viral Structure and replication, Nucleic acid and application

Chapters 16-17, 18-19, 20(Unit)

DNA extraction, Restriction enzyme paper lab, Paper plasmid lab Challenge DNA Cases, AP Lab -Molecular Biology (Gel Electrophoresis)

C. Evolutionary Biology

Early evolution of life, Evidence for evolution, Mechanisms of evolution

Chapters 22-26

AP Lab-Population Genetics and Evolution

III. Organisms and Populations (50% of course)

A. Diversity of Organisms

Evolutionary patterns, Survey of the diversity of life, Phylogenetic classification, Evolutionary techniques

Bacteriology Lab (inhibition of growth, staining techniques, etc.) Protozoan Lab

B. Structure and Function of Plants and Animals

Reproduction, growth and development, structural, physiological, and behavioral adaptations, response to the environment

Chapters 21, 32, 33, 34; Systems (parts of chapters 40-49) Unit

Chapters 29, 30, 35, 38; Chapters 36, 37, 39; Chapter 51

Survey of Invertebrates labs, Systems Packet labs, Dissection, AP Lab -Physiology of the Circulatory System, Plant Tissue Microscope work, AP Lab-Transpiration, AP Lab -Behavior: Habitat Selection

C. Ecology

Population dynamics, Communities and ecosystems, Global issues

Chapters 50, 52-55

AP Lab-Dissolves Oxygen and Aquatic Primary Productivity

Review for AP Exam

Acorn Book Outline Questions, Trial Tests, Trial Essays

Review of 13 AP Labs

After AP Exam: Research Project Work/Presentations

