

WAUCONDA SCHOOL DISTRICT 118

UNIT PLANNING ORGANIZER

Subject: AP Biology

Unit: 1 Chemistry of Life

Pacing: 17 days (Fall Semester)

STAGE 1 – DESIRED RESULTS

Essential Questions:

- How do atoms bond together to form molecules?
- Why do water molecules form hydrogen bonds?
- How does the hydrogen bonding of water molecules make Earth habitable?
- What determines the pH of a solution?
- How are monomers formed into polymers and polymers broken down into monomers?
- What is the structure and function of each of the biological molecules?

Big Ideas:

- 2. Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis.
- 4. Biological systems interact, and these systems and their interactions possess complex properties.

CollegeBoard (Priority Standards):

- 2.A: Growth, reproduction and maintenance of the organization of living systems require free energy and matter.
- 4.A: Interactions within biological systems lead to complex properties.

CollegeBoard (Supporting Standards):

- 2.A.3: Organisms must exchange matter with the environment to grow, reproduce and maintain organization.
- 4.A.1: The subcomponents of biological molecules and their sequence determine the properties of that molecule.

STAGE 2 – EVIDENCE

Concepts (What students need to know)	Performance Tasks (What students will be able to do)	21st Century Skills
- Carbon, nitrogen, and phosphorus moves from environment to organism to build carbohydrates, proteins, lipids, or amino acids. - Living systems depend on properties of water that result from its polarity and hydrogen bonding. - Cohesion - Adhesion - High specific heat capacity - Universal solvent supports reactions - Heat of vaporization - Heat of fusion - Water's thermal conductivity - monomer, polymer, structure, function, and properties of carbohydrates, lipids, nucleic acids, and proteins 4 steps of protein folding - dehydration synthesis and hydrolysis and the name of each of the bonds that hold together the monomers - basic carbon chains and functional groups - hydrogen, covalent, and ionic bonding - pH	- build models of each of the functional groups and predict the properties they each would give to a molecule - build models of each of the macromolecules	- using data and mathematical calculations to make predictions - graphical analysis - organizing information and creating visual models to display the information - plan and implement data collection strategies appropriate to a particular scientific question - connect and relate knowledge across various scales, concepts and representations in and across domains - perform data analysis using statistical tests and evaluate evidence

Common Formative/Summative Assessments:

➤ Unit 1 Biochem Exam — Chapters 2,3

Interim Assessments (Informal Progress Monitoring checks):

- **Cricket Lab:** students review scientific method and how to write a formal lab report
- **Chemistry Review Stations:** Students rotate through stations to review chemistry skills
- **Properties of Water Lab:** students investigate cohesion, adhesion, and polarity using soap and water.
- **Building Macromolecules:** students model structure and function of macromolecules
- **Functional Groups Activity:** Students present functional groups to class.
- **Macromolecule Pattern activity:** Students create 2D modules of 4 macromolecules and review functions and roles of each.

- **Macromolecule Lab:** Students test for macromolecules in a food substance.
- **Toothpickase Activity:** students will be able to describe the function of an enzyme through the completion and communication of a model for an enzyme experiment

Modified Common Assessments:

Modified Interim Assessments:

STAGE 3 – LEARNING PLAN (INSTRUCTIONAL PLANNING)

Suggested Resources/Materials/Informational Texts

<https://apcommunity.collegeboard.org/web/apbiology>

Suggested Research-based Effective Instructional Strategies

Identifying Similarities and Differences - The ability to break a concept into its similar and dissimilar characteristics allows students to understand (and often solve) complex problems by analyzing them in a more simple way. Teachers can either directly present similarities and differences, accompanied by deep discussion and inquiry, or simply ask students to identify similarities and differences on their own. While teacher-directed activities focus on identifying specific items, student-directed activities encourage variation and broaden understanding, research shows.

Summarizing and Note Taking - These skills promote greater comprehension by asking students to analyze a subject to expose what's essential and then put it in their own words. According to research, this requires substituting, deleting, and keeping some things and having an awareness of the basic structure of the information presented.

Cues, Questions, and Advance Organizers Cues - Questions, and advance organizers help students use what they already know about a topic to enhance further learning. Research shows that these tools should be highly analytical, should focus on what is important, and are most effective when presented before a learning experience

Cooperative Learning - Research shows that organizing students into cooperative groups yields a positive effect on overall learning. When applying cooperative learning strategies, keep groups small and don't overuse this strategy-be systematic and consistent in your approach.

Reinforcing Effort and Providing Recognition - Effort and recognition speak to the attitudes and beliefs of students, and teachers must show the connection between effort and achievement. Research shows that although not all students realize the importance of effort, they can learn to change their beliefs to emphasize effort.

Academic Vocabulary/ Word Wall	Enrichment/Extensions/ Modifications
Essential Vocabulary: monomer polymer dehydration synthesis hydrolysis hydrogen bond polar nonpolar specific heat cohesion adhesion high heat of vaporization amino acid saccharide nucleotide functional groups methyl hydroxyl carboxyl carbonyl amine phosphate group sulfhydryl covalent bond ionic bond pH Worth-Knowing Vocabulary: hydrophobic hydrophilic alpha helix beta pleated sheets ester linkage peptide bond phosphodiester bond fatty acid glycerol steroid triglyceride cellulose chitin starch glycogen	Building macromolecules

glucose catalyst	
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