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National Science Education Standards

https://www.csun.edu/science/ref/curriculum/reforms/nses/nses-complete.pdf

Science as Inquiry

As a result of activities in grades 9 - 12, all students should develop:

- Abilities necessary to do scientific inquiry.
- Understandings about scientific inquiry.
- Abilities to formulate and revise scientific explanations and models using logic and evidence.

Life Science—Content Standard C

As a result of their activities in grades 9-12, all students should develop an understanding of:

- The cell--Changes in DNA (mutations) occur spontaneously at low rates. Some of these changes make no difference to the organism, whereas others can change cells and organisms.
- In all organisms, the instructions for specifying the characteristics of the organism are carried in DNA.
- Biological evolution—Species evolve over time. Evolution is the consequence of the interactions of 1) the potential for a species to increase its number, 2) the genetic variability of offspring due to mutation and recombination of genes, 3) a finite supply of the resources required for like and 4) the ensuing selection by the environment of those offspring better able to survive and leave offspring.
- Biological classifications are based on how organisms are related. Organisms are classified into a hierarchy of groups and subgroups based on similarities which reflect their evolutionary relationships. Species is the most fundamental unit of classification.

Science and Technology—Content Standard E

As a result of activities in grades 9-12, all students should be able to:

- Identify a problem or design an opportunity.
- Propose designs and choose between alternative solutions.
- Implement a proposed solution.
- Evaluate the solution and its consequences.
- Communicate the problem, process, and solutions.

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Science In Personal and Social Perspectives—Content Standard F:

As a result of activities in grades 9-12, all students should develop understanding of:

- Personal and community health
    - Hazards and the potential for accidents exist. Regardless of the environment, the possibility of injury, illness, disability, or death may be present. Humans have a variety of mechanisms—sensory, motor, emotional, social, and technological— that can reduce and modify hazards.
    - The severity of disease symptoms is dependent on many factors, such as human resistance and the virulence of the disease-producing organism. Many diseases can be prevented, controlled, or cured. Some diseases, such as cancer, result from specific body dysfunctions and cannot be transmitted.
    - Personal choice concerning fitness and health involves multiple factors. Personal goals, peer and social pressures, ethnic and religious beliefs, and understanding of biological consequences can all influence decisions about health practices.
- Natural and human-induced hazards
    - Natural and human-induced hazards present the need for humans to assess potential danger and risk. Many changes in the environment designed by humans bring benefits to society, as well as cause risks. Students should understand the costs and trade-offs of various hazards—ranging from those with minor risk to a few people to major catastrophes with major risk to many people. The scale of events and the accuracy with which scientists and engineers can (and cannot) predict events are important considerations.
- Science and technology in local, national, and global challenges

History and Nature of Science—Content Standard G

As a result of activities in grades 9-12, all students should develop an understanding of:

- Science as a human endeavor—Individuals have contributed and will continue to contribute to the scientific enterprise. Doing science or engineering can be as simple as an individual conducting field studies or an complex as hundreds of people working on a major scientific question or technological problem. Pursuing science as a career or as a hobby can be both fascinating and intellectually rewarding.

- Nature of scientific knowledge—Science distinguishes itself from other ways of knowing and from other bodies of knowledge through the use of empirical standards, logical arguments, and skepticism, as scientists strive for the best possible explanations about the natural world.
- Scientific explanations must meet certain criteria. First and foremost, they must be consistent with experimental and observational evidence about nature, and must make accurate predictions, when appropriate. They should also be logical, respect the rules of evidence, be open to criticism, report methods and procedures, and make knowledge public.
- Because all scientific ideas depend on experimental and observational confirmation, all scientific knowledge is, in principle, subject to change as new evidence becomes available. The core ideas of science such as the conservation of energy or the laws of motion have been subjected to a wide variety of confirmations and are therefore unlikely to change in the areas in which they have been tested.
- Historical perspectives in science.