

National & State Specific Curriculum, Framework and Codes for Classroom Use of Immune Attack

National Standards

<http://books.nap.edu/html/nses/html/6e.html#ls>

<http://www.nap.edu/readingroom/books/nses/pdf/index.html> (PDF)

NS.9-12.3 Life Science: As a result of their activities in grades 9-12, all students should develop understanding of

- The cell
- Molecular basis of heredity
- Biological evolution
- Interdependence of organisms
- Matter, energy, and organization in living systems
- Behavior of organisms
- Note: no immunology

Alabama

http://www.alabamainteractive.org/alabamainteractive_shell/Welcome.do?url=http://www.alsde.edu/html/home.asp

Immunology not taught

Alaska

http://www.eed.state.ak.us/tls/assessment/GradeLevelExpectations/Science%206.15.05/Science_GLEs_11th_Protected.pdf

Course: Grade 11 Science

State Code/Description:

SC2.3

- Describing the functions and interdependencies of the organs within the immune system and within the endocrine system

Arizona

<http://www.ade.state.az.us/standards/science/downloads/strand4.pdf>

Immunology not taught

Arkansas

<http://arkansased.org/teachers/frameworks2.html#science>

Course: High School Biology and Anatomy and Physiology (the content is based on the overall high school experience – not grade specific)

State Code and Description:

BS.11.AP.1 (anatomy)

- Identify the components of the immune and lymphatic systems

BS.11.AP.2 (anatomy)

- Discuss the physiological mechanisms of the immune and lymphatic systems

BS.11.AP.3 (anatomy)

- Identify the macroscopic, microscopic, and molecular structure of the immune and lymphatic systems

BS.11.AP.4 (anatomy)

- Describe disorders associated with the immune and lymphatic systems

NS.12.B.5 (biology)

- Describe the relationship between the germ theory of disease and our current knowledge of immunology and control of infectious diseases

California

<http://www.cde.ca.gov/be/st/ss/scbiology.asp>

Course: High School Biology 9-12 (not grade specific)

State Code and Description:**No state code.**

Organisms have a variety of mechanisms to combat disease. As a basis for understanding the human immune response:

- a. Students know the role of the skin in providing nonspecific defenses against infection.
- b. Students know the role of antibodies in the body's response to infection.
- c. Students know how vaccination protects an individual from infectious diseases.
- d. Students know there are important differences between bacteria and viruses with respect to their requirements for growth and replication, the body's primary defenses against bacterial and viral infections, and effective treatments of these infections.
- e. Students know why an individual with a compromised immune system (for example, a person with AIDS) may be unable to fight off and survive infections by microorganisms that are usually benign.
- f. Students know the roles of phagocytes, B-lymphocytes, and T-lymphocytes in the immune system

Connecticut

<http://www.sde.ct.gov/sde/cwp/view.asp?a=2618&q=320890>

Course: High School Biology 9-12 (not grade specific)

State Code and Description:**No state code.**

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***(same guidelines as California)**

Delaware

http://www.doe.state.de.us/files/pdf/schoolcurr_Standard6final.pdf

Course: Science Standard 6: Life Processes Grade 9-12 (not grade specific)

State Code and Description:**No code**

The immune system consists of cells, organs, and secretions that protect the organism from toxins, irritants, and pathogens.

Recognize that in order to help maintain the health of an organism, the immune system works in nonspecific ways (e.g., skin, mucous, membranes) and specific ways (e.g., antibody-antigen interactions.)

District of Columbia

<http://www.k12.dc.us/dcps/standards/Subject/Biology/Biology-complete.pdf>

Course: Grade 12 Biology

State Code and Description:

B.7.5

- Investigate and cite specific examples of how the mammalian immune system is designed to protect against microscopic organisms and foreign (or non-self) substances from outside the body and against some aberrant (e.g., cancer) cells that arise within.

Florida

<http://data.fldoe.org/crsCode/912/Science/Biological%20Science/pdf/2000350.pdf>

Course: 2000350 - Anatomy and Physiology

State Code/Description:

SC.F.1.4.8

- Demonstrate understanding of conditions that cause change in normal body functions (e.g., injury, infection, mutation, metabolic disorder) and the response of the body to those conditions (e.g., inflammatory response, clotting, immune response).

Georgia

<http://georgiastandards.org/science.aspx>

Course: Science – Anatomy & Physiology (not grade specific)

State Code/Description:

SAP4

- Students will analyze the physical, chemical, and biological properties of process systems as these relate to transportation, absorption and excretion, including the cardiovascular, respiratory, digestive, excretory and immune systems.

Hawaii

<http://standardstoolkit.k12.hi.us/index.html>

Immunology not taught

Idaho

<http://www.sde.idaho.gov/ContentStandards/docs/Science%20Standards/ICSGrade9and10science.doc>

Immunology not taught

Illinois

<http://www.isbe.state.il.us/ils/science/pdf/goal12.pdf>

Immunology not taught

Indiana

<http://www.doe.state.in.us/standards/docs-TeacherEdition/2006-06-12-Teacher-Science.pdf>

Course: Biology 1 (High School)

State Code/Description

B.1.20

- Recognize that and describe how the human immune system is designed to protect against microscopic organisms and foreign substances that enter from outside the body and against some cancer cells that arise within.

Iowa

<http://www.iowamodelcore.org/content/Science>

Immunology not taught

Kansas

<http://www.ksde.org/LinkClick.aspx?fileticket=pDh1xi/EjYM=&tabid=144>

Immunology not taught

Kentucky

<http://www.education.ky.gov/NR/rdonlyres/6C5BD824-B2E3-4D10-B219-7878176323DC/0/SPLDScience.pdf>

Immunology not taught

Louisiana

<http://www.doe.state.la.us/lde/uploads/2911.pdf>

Course: Biology Benchmarks 9-12

State Code/Description:

LS-H-G2

- contrasting how organisms cause disease

LS-H-G3

- explaining the role of the immune system in fighting disease

LS-H-C7

- comparing viruses to cells.

Maine

<http://www.maine.gov/education/lres/st.htm>

Course: high school biology (not grade specific)

State Code/Description:

No Code

- Explain how the human body protects itself against disease and how the body might lose that ability

Maryland

<http://www.mdk12.org/instruction/curriculum/>

Immunology not taught

Massachusetts

<http://www.doe.mass.edu/frameworks/scitech/1006.pdf>

Course: Full year High School Biology

State Code/Description:

CB(Cell Biology)2.8

- compare and contrast a virus and a cell in terms of genetic material and reproduction

Michigan

<http://www.k12.wy.us/SAA/standards/science.pdf>

Course: Life Science (High School)

State Code/Description

Cells (LC)III.1.2

- Describe the life cycle of an organism associated with human disease.

Cells (LC)III.1.4

- Explain how living things maintain a stable internal environment. *Key concepts:* Related systems/cells/ chemicals—excretory system, endocrine system, circulatory system, hormones, immune response, white blood cell, bacteria, virus. Factors/ mechanisms under control—temperature, disease/infection, homeostasis.

Minnesota

http://education.state.mn.us/MDE/Academic_Excellence/Academic_Standards/Science/index.htm

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Immunology not taught

Mississippi

not available

Missouri

http://dese.mo.gov/divimprove/curriculum/GLE/SciGLE_FINAL-4.2005.pdf

Immunology not taught

Montana

<http://www.opi.mt.gov/PDF/Accred/ScienceExpect.pdf>

Immunology not taught

Nebraska

<http://www.nde.state.ne.us/ndestandards/documents/ScienceStandards.pdf>

Immunology not taught

Nevada

<http://www.doe.nv.gov/standards/standscience.html>

Course: Life Science (9-12)

State Code/Description:

L.12.B.3

- Students know disease disrupts the equilibrium that exists in a healthy organism

New Hampshire

<http://www.ed.state.nh.us/education/doe/organization/curriculum/Science/documents/LifeScienceGSE.pdf>

Course: Life Science (9-12)

State Code/Description:

S:LS4:11:1.1

- Recognize that the immune system, endocrine system, and nervous system can affect the homeostasis of an organism.

S:LS4:11:2.1

- Explain that disease in organisms can be caused by intrinsic failures of the system or infection by other organisms, and describe as well as provide examples of how some diseases are caused by: the breakdown in cellular function, congenital conditions, genetic disorders, malnutrition, and emotional health, including stress

S:LS4:11:2.2

- Explain that vaccines were developed to reduce or eliminate diseases; and provide examples of how these medical advances have proven to be successful.

S:LS4:11:2.3

- Describe and provide examples of how new medical techniques, efficient health care delivery systems, improved sanitation, and a more complete understanding of the nature of disease provides today's humans a better chance of staying healthier than their forebears

S:LS4:11:2.6

- Use evidence to make and support conclusions about the ways that humans or other organisms are affected by environmental factors or heredity (e.g., pathogens, diseases, medical advances, pollution, mutations)

S:LS4:11:3.2

- Explain how the immune system functions to prevent and fight disease.

S:LS4:11:3.3

- Explain how the immune system, endocrine system, or nervous system works and draw conclusions about how systems interact to maintain homeostasis in the human body.

New Jersey

<http://www.state.nj.us/education/frameworks/science/>

Immunology not taught

New Mexico

<http://nmlites.org/standards/science/index.html>

Immunology not taught

New York

<http://www.emsc.nysed.gov/ciai/mst/pub/mststa4.pdf>

Course: High School Science (not grade specific)

State Code/Description:

No State Code

- explain the basic biochemical processes in living organisms and their importance in maintaining dynamic equilibrium.
- explain disease as a failure of homeostasis.
- relate processes at the system level to the cellular level in order to explain dynamic equilibrium in multi-celled organisms.
- This is evident, for example, when students: investigate the biochemical processes of the immune system, and its relationship to maintaining mental and physical health

North Carolina

<http://www.dpi.state.nc.us/curriculum/science/scos/>

Course: Biology (high school 9-12)

Course Code/Description:

(Unity and Diversity of Life Strand)4.04

- Analyze and explain the interactive role of internal and external factors in health and disease:

Instruction should include basic understanding of:

- Immune Response
- Function and relationship of T-cells, B-cells, antibodies/antigens.
(**Overview only** of different types and roles of T and B cells: role of memory cells, B cells make antibodies, some T cells help B cells make antibodies, other T cells kill infected cells.)
- Passive and active immunity.
- Vaccines.

North Dakota

<http://www.dpi.state.nd.us/standard/content/science/index.shtm>

Course: Biology (gr11-12)

State Code/Description

(Science)11-12.4.1.

- Explain the importance of cell differentiation in the development of tissues, organs, organ systems, and multi-cellular organisms.

Ohio

<http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODEDetail.aspx?page=3&TopicRelationID=1225&ContentID=834&Content=32645>

Immunology not taught

Oklahoma

<http://www.sde.state.ok.us/acrob/pass/PASSGrade/n-HiSc-Sci.pdf>

Immunology not taught

Oregon

<http://www.ode.state.or.us/teachlearn/real/standards/Default.aspx>

Immunology not taught

Pennsylvania

<http://www.pde.state.pa.us/k12/lib/k12/scitech.pdf>

Immunology not taught

Rhode Island

<http://www.ridoe.net/Instruction/gle.aspx>

Course: Life Sciences (9-11)

State Code/Description:

LS4 (9-11)-10a

- Students demonstrate an understanding of human body systems by explaining how the roles of the immune, endocrine, and nervous systems work together to maintain homeostasis.

South Carolina

http://ed.sc.gov/agency/offices/cso/standards/science/course_standards.html

Immunology not taught

South Dakota

<http://doe.sd.gov/contentstandards/science/newstandards.asp>

Immunology not taught

Tennessee

<http://www.state.tn.us/education/ci/sci/scigate.shtml>

Immunology not taught

Texas

<http://www.tea.state.tx.us/rules/tac/chapter112/ch112c.html>

Course: Biology (9-11)

State Code/Description:

112.43. Biology (Chapter 112. Texas Essential Knowledge and Skills for Science Subchapter C. High School)

112.43.4.

- The student knows that cells are the basic structures of all living things and have specialized parts that perform specific functions, and that viruses are different from cells and have different properties and functions. The student is expected to:

112.43.4 (C)

- compare the structures and functions of viruses to cells and describe the role of viruses in causing diseases and conditions such as acquired immune deficiency syndrome, common colds, smallpox, influenza, and warts; and

112.43.4(D)

- Identify and describe the role of bacteria in maintaining health such as in digestion and in causing diseases such as in streptococcus infections and diphtheria.

Utah

<http://www.schools.utah.gov/curr/sci/secondary/BiologyCore.swf>

Immunology not taught

Vermont

http://education.vermont.gov/new/pdfdoc/pgm_curriculum/science/grade_expectations/ge_grades_9-12_life.pdf

Immunology not taught

Virginia

<http://www.pen.k12.va.us/VDOE/Instruction/Science/ScienceCF-BIO.pdf>

Course: Biology (7-12)

State Code/Description:

BIO.5 d, e

- The student will investigate and understand life functions of archaebacteria, monerans (eubacteria), protists, fungi,

plants, and animals including humans. Key concepts include d) maintenance of homeostasis; and e) human health issues, human anatomy, body systems, and life functions

- Specialized cells of the immune system and the molecules they produce are designed to protect against organisms and substances that enter from outside the body and against some cancer cells that arise from within.

Washington

<http://www.k12.wa.us/CurriculumInstruct/science/pubdocs/ScienceEALR-GLE.pdf>

Course: Science 9-10 (Living Systems)

State Code/Description:

LS1.2.8 (Human Biology)

- Analyze how human organ systems regulate growth, development, and life functions.
 - a. Name the structural and functional characteristics of human organ systems, including the endocrine, immune, nervous, reproductive, and skin systems.
 - b. Explain how human organ systems help maintain human health.

West Virginia

<http://wveis.k12.wv.us/nclb/Content/public/cso/cso.cfm>

Course: Human Anatomy and Physiology (9-12)

State Code/Description:

SC.O.PA.2.30

- assess the role of components of the immune system in defending the body.

Wisconsin

<http://dpi.wi.gov/standards/scif12.html>

Immunology not taught

Wyoming

<http://www.k12.wy.us/SAA/standards/science.pdf>

Immunology not taught