



Adventist Education

A JOURNEY TO EXCELLENCE

Chemistry

2010

**SECONDARY SCIENCE STANDARDS
IN SEVENTH-DAY ADVENTIST SCHOOLS**

OFFICE OF EDUCATION | North American Division Seventh-day Adventist Church

Science Standards

OUR GOAL

The goal of Seventh-day Adventist education is about more than quality teachers providing innovative instruction. Adventist education aims to provide student learning infused with Christian faith and an Adventist worldview. To achieve this goal Seventh-day Adventist standards for grades 9-12 subjects have been carefully developed to embody Seventh-day Adventist beliefs and to prepare students for life-long learning, equipping them for earthly service and heavenly citizenship. An education of this kind imparts strong academic knowledge and a clear picture of Christ and His love for mankind.

These standards focus on what students should know, understand and be able to do. They will be a useful tool for teachers in developing lessons and ensure a thorough preparation for college or university when fully implemented across the curriculum.

Seventh-day Adventist Secondary Standards:

1. Provide clear expectations for student learning and accountability.
2. Provide an essential user-friendly tool for developing instruction.
3. Transform textbooks from curriculum guide to a resource for instruction.
4. Provide for a complete and uniform Adventist secondary curriculum.
5. Have been developed exclusively by Seventh-day Adventist educators.
6. Have been aligned with the goals of Journey to Excellence
7. Have been developed using national and state standards, Adventist curriculum guides, and standards compendiums from McRel and Ten Sigma.

RATIONALE

Secondary Science Standards for Seventh-day Adventist Schools seeks to ensure that the beliefs and values of our Adventist Christian faith are integrated into the curriculum. Science instruction from this curriculum should help students learn to see God's image in His creation and reflect His image while developing proficiency in different sciences. This kind of education imparts more than academic knowledge. It fosters the balanced development of the whole person to prepare them for earthly service and heavenly citizenship.

These carefully developed science standards are a practical tool to assist teachers in focusing their instruction so that all students are competent and engaged successfully in understanding, exploring, analyzing, and applying scientific concepts and principles to various life situations. These standards reflect multiple perspectives from diverse spiritual, civic, and social communities. They make interesting and enjoyable connections within the sciences, and between science and other fields of learning. The intent is to focus on the essence of what students should learn and retain.

CREDITS

The following resources were referenced in developing *Secondary Science Standards for Seventh-day Adventist Schools*: a sampling of state standards, the National Academy of Sciences standards, NAD Curriculum Guide for Science, McREL Compendium of Standards, Ten Sigma Standards, and Journey to Excellence.

STANDARDS CODING

The standards and essential learnings have been coded so that educators can easily refer to them in their curriculum, instruction, assessment, and professional development activities. The coding system begins with these course abbreviation: A&P—Anatomy and Physiology, BIO1—Biology I, BIO2—Biology II, CHM—Chemistry, ESC—Earth Science, ECO—Ecology/Environmental Science, PSC—Physical Science, PHY—Physics. The first numeral (CHM.3.2) refers to the standard and the second numeral (CHM.3.2) refers to the subcategory under the standard.

JOURNEY TO EXCELLENCE

When the standards on the next page have been met the instruction in this course will have also met some of the Goals and Essential Core Elements for the curriculum in Seventh-day Adventist schools listed in *Journey to Excellence*. The number (1.A) refers to the Goal and the letter (1.A) refers to the Essential Core Element that is met.

ANATOMY & PHYSIOLOGY

- | | |
|----------------|----------------|
| 1.A,E | 6.B,D,F |
| 2.F | 7.A |
| 3.C,E | 8.E,G |
| 4.B,E | 9.A |
| 5.A, B,C,D,E,F | 10.A,B,C,D,E,F |

BIOLOGY I

- | | |
|-------------|-------------|
| 1.A,C,E,G,H | 6.A,B,C,D,F |
| 2.F | 7.A |
| 3.A,B,E | 8.E,G |
| 4.A,B,E,D | 9.A,C,D |
| 5.A,B,C,E,F | 10.A,C,E,F |

BIOLOGY II

- | | |
|-------------|-------------|
| 1.A,C,E,G,H | 6.A,B,C,D,F |
| 2.F | 7.A |
| 3.A,B,E | 8.E,G |
| 4.A,B,E,D | 9.A,C,D |
| 5.A,B,C,E,F | 10.A,C,E,F |

CHEMISTRY

- | | |
|-------------|---------------|
| 1.A,B,E,F | 7.A,D |
| 2.F | 8.A,C,D,E,F,G |
| 4.B,C,E | 9.A |
| 5.A,C | 10.A,B,E,F |
| 6.B,C,D,E,F | |

EARTH SCIENCE

- | | |
|-------------|--------------|
| 1.A,E | 7.A,D |
| 2.F | 8.E |
| 4.B,C,D,E | 9.A,D |
| 5.A | 10.A,C,D,E,F |
| 6.B,C,D,E,F | |

ECOLOGY/ENVIRONMENTAL SCIENCE

- | | |
|-------------|--------------|
| 1.A,E | 7.A,D |
| 2.F | 8.C,E |
| 4.A,B,C,D,E | 9.A,D |
| 5.A | 10.A,C,D,E,F |
| 6.B,C,D,E,F | |

PHYSICAL SCIENCE

- | | |
|-----------|-----------|
| 1.A,C,E | 8.C,E,F,G |
| 2.F | 8.E |
| 4.B | 9.A |
| 6.B,C,D,F | 10.A,E,F |
| 7.A | |

Science Standards—Chemistry

COURSE FOCUS [Apply the following for each content standard.]

CHM.1 Identify SDA Christian principles and values in correlation with science.

- CHM.1.1 Recognize God's power as Designer, creator, Sustainer, and Redeemer in the universe.
- CHM.1.2 Acknowledge God as the Author of all scientific principles and laws regardless of man's interpretation.
- CHM.1.3 Develop stewardship and service attitudes toward health, life, and earth's environment.
- CHM.1.4 Apply Biblical principles of Christian morality, integrity, and ethical behavior to all aspects of life.
- CHM.1.5 Equip students with Christian perspectives on scientific issues.

COURSE ABILITIES [Apply the following to each content standard.]

CHM.2 Develop abilities in science.

- CHM.2.1 Develop critical and creative thinking skills (analysis, evaluation, divergent questioning, modeling).
- CHM.2.2 Understand and utilize the scientific method of problem solving.
- CHM.2.3 Utilize the principles and methodologies of cooperative learning.

CHM.3 Be able to apply science knowledge and skills to a variety of purposes.

- CHM.3.1 Recognize scientific principles and laws as tools to solve problems in everyday life.
- CHM.3.2 Apply the scientific method in analysis of controversial topics, e.g., cloning, global warming, stem cell research.
- CHM.3.3 Read, write, and interpret scientific documents (lab write-ups, journals, scientific publications).
- CHM.3.4 Conduct research in the content area.
- CHM.3.5 Engage in various uses of technology.

COURSE CONTENT: Structure and Properties of Matter, Chemical Interactions, Stoichiometry, Solutions [Understand, explore, analyze, apply]

CHM.4 Be able to understand basic chemistry concepts.

- CHM.4.1 Recognize God as the Designer and Creator of matter with inherent properties and laws.
- CHM.4.2 Demonstrate understanding of structure and properties of matter.
- CHM.4.3 Describe the interactions of matter and energy (bonding, chemical reactions, conservation).
- CHM.4.4 Integrate balanced equations, conversion factors, ratio and proportion, and dimensional analysis.
- CHM.4.5 Identify the types and properties of solutions.

CHM.5 Be able to safely explore chemistry concepts using the scientific method.

- CHM.5.1 Explore the design of the periodic table and structure of molecules.
- CHM.5.2 Examine the relationship between energy and chemical reactions (bond, activation, thermal).
- CHM.5.3 Solve stoichiometric problems with appropriate chemical and mathematical skills.
- CHM.5.4 Investigate factors that define and affect solutions (pH, concentration, temperature, pressure).

CHM.6 Be able to analyze chemical data.

- CHM.6.1 Correlate the relationship between periodicity and molecular structure in the periodic table.
- CHM.6.2 Interpret the relationship between energy and chemical reactions.
- CHM.6.3 Evaluate conditions and factors that affect stoichiometric results.
- CHM.6.4 Predict solution changes as factors are manipulated.

CHM.7 Be able to apply the principles of chemistry to health, life, and the physical environment.

- CHM.7.1 Develop an increased respect for the Designer of all matter in the universe.
- CHM.7.2 Utilize various chemical resources to influence lifestyle choices (warning labels, MSDS, nutritional labels, Internet resources).
- CHM.7.3 Implement chemical principles to chemistry-related issues in society.

DEVELOPMENT COMMITTEE MEMBERS

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