

APPLIED CHEMISTRY

LENGTH OF TIME: every day for one semester

GRADE LEVEL: 10-12

COURSE STANDARDS:

Students will:

1. Work in cooperative teams for the purposes of performing the required investigations, and acquiring knowledge and information needed to address the chapter activities. (PA Std 3.1.12.a, 3.1.12.b)
2. Reflect on the results of inquiry activities and relate them to larger concepts. (PA Std 3.2.10b, 3.1.12.c, 3.7.10.a)
3. Be introduced to careers in chemistry. (PA Std 3.8.10.a)
4. Revisit fundamental chemical principles throughout the course, extending and deepening their understanding of these principles as they apply them to new concepts. (PA Std 3.4.10a, 3.4.10b, 3.4.12.a, 3.4.12.b)
5. Investigate new situations and be challenged to either explain observed phenomena using established constructs or develop new constructs that more adequately explain the phenomena. (PA Std 3.2.10a, 3.2.10b, 3.2.12,a-d)
6. Use math, primarily algebraic expressions, equations and graphs as a way of representing ideas symbolically and recognize its usefulness in exploring and understanding the world around them. (PA Std 3.7.10a)
7. Solve problems related to technological applications and related issues. (PA Std 3.2.12a, 4.8.10c, 3.8.10c)
8. Read and comprehend informational materials to develop understanding and expertise and produce written or oral work that: (PA Std 3.2.10a, 3.1.10a)
 - Restates or summarizes information
 - Relates new information to new experience or prior knowledge
 - Extends ideas
 - Makes connections to related topics of information
9. Participate in group meetings for the purpose of making decisions and obtaining responses. (PA Std 3.7.10d)
10. Demonstrate an understanding of rules of the English language in every written or oral communication throughout the course. (PA Std 3.1.10a, 3.7.10c)

RELATED PA ACADEMIC STANDARDS FOR SCIENCE AND TECHNOLOGY

- 3.1 Unifying Themes
 - A. Systems
 - B. Models
 - C. Patterns
- 3.2 Inquiry and Design
 - A. Nature of Scientific Knowledge
 - B. Process Knowledge

- C. Scientific Method
- D. Problem Solving in Technology
- 3.4 Physical Science, Chemistry and Physics
 - A. Matter
- 3.7 Technological Devices
 - A. Tools
 - B. Instruments
 - C. Computer Operations
 - D. Computer Software
- 3.8 Science, Technology and Human Endeavors
 - A. Constraints
 - C. Consequences and Impacts

RELATED PA ACADEMIC STANDARDS FOR ENVIRONMENT AND ECOLOGY

- 4.8 Humans and the Environment
 - C. Human Impacts

PERFORMANCE ASSESSMENTS:

Students will demonstrate achievement of the standards by:

1. Constructing a calendar of major events in chemistry history, including famous chemist's birthdays and their contributions to the science. (Course Standard 1,2,3,8,10)
2. Investigate the safety of household chemicals using the universal safety symbols to determine the danger of chemicals. (Course Standard 1,2,4,5,6,8,9,10)
3. Designing and carrying out experiments to determine the toxicity of certain chemicals to plants. (Course Standard 1,2,4,5,6,7,8,9,10)
4. Creating a chemistry board game that demonstrates knowledge of chemicals and their uses. (Course Standard 3,4,5,6,7,8,9,10)

DESCRIPTION OF COURSE:

Applied Chemistry is an alternative chemistry course for those students who would not normally enroll in chemistry. The activity-based approach of this course will allow students to learn about chemistry concepts through hands-on exploration. The topics covered in Applied Chemistry will be related to timely, real world issues with an emphasis on technology.

TITLES OF UNITS:

- | | |
|----------------------------|---------|
| 1. Qualitative Analysis | 2 weeks |
| 2. The Structure of Matter | 3 weeks |
| 3. Chemical Bonding | 3 weeks |
| 4. Chemicals in Action | 2 weeks |
| 5. Acids and Bases | 2 weeks |
| 6. Chemistry of Food | 3 weeks |
| 7. Consumer Chemistry | 3 weeks |

SAMPLE INSTRUCTIONAL STRATEGIES:

1. Inquiry based activities
2. Issues based curriculum revisits major chemistry themes
3. Authentic assessment with appropriate rubrics
4. Cooperative group learning
5. Use of educational technology
6. Problem solving
7. Learning extensions

MATERIALS:

1. Chemistry; T. Myers, K. Oldham, S. Tocci; Holt, Rinehart, and Winston; 2006
2. Computers with appropriate software and Internet access
3. Assorted chemical lab equipment and chemicals

METHODS OF ASSISTANCE AND ENRICHMENT:

1. Opportunities for re-testing
2. Tutorial opportunities
3. Strategies developed with the special education teachers
4. Alternative modes of assessment
5. Resource room
6. Minimal homework

PORTFOLIO DEVELOPMENT:

In order to document achievement and show evidence of improvement in science, students may include in their portfolio selections from the following:

1. Selections from their activity journal
2. Examples of extended learning
3. Examples of major projects, reports, presentations, or designed experiments developed to support major themes in chemistry

METHODS OF EVALUATION:

1. Problem solving based tests
2. Oral presentations
3. Activity journal evaluations
4. Group and individual projects with standards based rubrics tailored for each project
5. Written reports and proposals
6. Peer review prior to instructor evaluation
7. Self-evaluation

INTEGRATED ACTIVITIES:

1. Concepts
 - communicate and defend scientific argument
 - emergence in form and function
 - technology in society

2. Communication
 - reading text for information
 - writing for a variety of purposes
 - oral response and presentations
 - exchange of information with classmates
 - cooperative group communication
3. Thinking/Problem Solving
 - use effective research to gather information
 - drawing conclusions
 - inferring meaning from text
 - altering paradigms
4. Application of Knowledge
 - use of computer and Internet
 - appropriate use of laboratory equipment
 - oral and written communications to instructors and/or classmates
 - traditional library and computer aided research
5. Interpersonal Skills
 - demonstrate skills of communication, negotiating, and cooperating with others
 - demonstrate that they can work effectively in groups
 - give and take of peer evaluation