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VHS counselor!**

Material Science A/B

Instructor: Mrs. Peterson

Course Description

Material Science A/B

Grades 10-12

Prerequisite: Pass Biology and Algebra B with at least a “C”

10 credits

Material Science A/B is a 2-semester course that meets graduation requirements as a Physical Science with general elective credit (maximum of 5 credits per semester, non-repeatable). Fulfilling a part of the Engineering curricular path, the course is a college A-G science option. Material Science is a multidisciplinary approach to science and technology that teaches students to better understand the properties and uses of materials. It combines scientific theories, practical applications of technology, significant hands-on laboratory experiences (two labs per week), and technical report writing to prepare students to work in a technologically rich environment.

What is Material Science Technology?

Today’s technological society is driven by the development and use of materials. From advanced industrial applications to common everyday objects, materials affect all our lives. Very few materials are utilized just as they are found in nature. Essentially all materials are modified in some way to maximize their usefulness. The demand for new and improved materials continues to fuel the global economy in this new century.

Material Science Technology is a multidisciplinary approach to science and technology that teaches students to better understand the properties and uses of materials.

Course Goals

After successful completion of the Material Science course students will be able to:

- Define material problems and design experiments to investigate those problems
- Apply laboratory skills (select and use appropriate tools and technology) and techniques to investigate and compare materials
- Explain differences between and the results of non-destructive vs. destructive testing
- Gather data correctly
- Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions
- Apply the correct scientific knowledge/theory to explain observed material properties
- Use analytical thinking skills to modify materials for desired properties
- Graph experiment results
- Formulate explanations using logic and evidence
- Communicate experimental results through written reports

Course Content

Material Science is concerned with the study of materials in our everyday lives. The course is separated into the categories of Solids, Metals, Ceramics, Polymers, and Composites. The Solids unit (6 weeks) provides an introduction to materials and shows students the broad range of materials that exist. The Metals (8 weeks), Ceramics (9 weeks), Polymers (7 weeks), and Composites (5 weeks) units further classify materials and show the importance of specialized materials to our technological progress.

Each unit exposes students to relevant equipment and projects that enable them to better understand materials. A key feature of Material Science Technology is the ability to use materials to solve problems. Students learn that there are usually many possible solutions to a problem – some more practical and more economical than others. In the work environment, problem solving is a commonly needed skill. Material Science will teach students to solve problems, a characteristic that is prized by today's employers.

Student Assessment Methods

Students' learning will be assessed through tests/quizzes, class participation, written lab reports, and homework. Students will also be tested on their general chemistry knowledge on the California STAR Test in April.

Course Alignment with California State Standards in Chemistry and Laboratory Sciences

Many of the CA Standards for Chemistry are revisited in Material Science. These standards include: Atomic and Molecular Structure: 1a,1b,1c,1d,1e; Chemical Bonds: 2a,2b,2c,2g,2h; Conservation of Matter and Stoichiometry: 3a,3d,3e,3f,3g; Solutions: 6a,6b,6c,6d; Chemical Thermodynamics: 7a,7b,7c,7d; Organic Chemistry and Biochemistry: 10a,10b,10d,10e. However, the strength of this course lies in the CA Standards for Science, Investigation & Experimentation - Grades 9 to 12: 1a,1b,1c,1d,1f,1j,1k,1l,1n.

How is This Course Different than Chemistry?

While similar to Chemistry, and indeed learning many Chemistry concepts throughout the course, Material Science is significantly different in both approach and depth. Properties and common uses of Solids and Metals will be evaluated to a greater degree, whereas different areas of study include Ceramics, Polymers and Composites. Much of the learning will occur through hands-on investigation. The course includes 66 experiments, approximately two per week. Each investigation will be treated similarly to industry laboratory inquiries in terms of investigation, problem-solving and written report (technical writing) phases. An emphasis on analytical thinking and using the scientific process to solve problems will be applied. After the course is established, local area industries will be asked to participate in suggesting and/or developing supplemental investigations relevant to their business' material science needs.