Califor	nia State University, San Marcos		FORM E-T		
 AUTHORIZATION TO OFFER TOPICS COURSES FOR ACADEMIC CREDIT THROUGH EXTENDED STUDIES • 					
(Note: Extended Studies sections of topic classes for which the appropriate form E-T is not on file in the Office of Academic Programs will be removed from BANNER as periodic audits of course offerings are performed.)					
Note: Any proposed topic can only be offered two times before being converted to a non-topics course. Academic Programs will assign the appropriate suffix and edit the topic description provided.					
1. C	College of: <u>Education</u> 2. Center/H	rogram/Department:			
3. In	nstructor	name of the "instructor of record.")			
4. Т	opic Abbreviation and Number: EDUC E592K	5. Grading Method <u>N (Nor</u>	mal)		
6. T	erm <u>SUMMER</u> 7. Year <u>2007</u> 8. Variable Units* 2	<u> </u>			
9. H	las this topic been offered previously? <u>Yes X.</u> No If yes	s, indicate term(s)	Year		
10. Topic Title: Chemistry Through Inquiry					
11. 1 *	Fopic Description: Note: This part can be skipped if answer to part 9 is "yes." (N Iso attach the topic description on a separate sheet if you do not have enough space."	OTE: Please provide detailed information about the	e topic. Please type. You may		
This course, prepared in collaboration with the American Chemical Society, helps teachers learn inquiry-based physical science activities while improving their science-content knowledge. The course is based on the National Science Education content standards for "Physical Science" and "Science as Inquiry" and is intended for teachers of Grades 3-8. Through the use of text, graphics, short videos, and off-line activities, course participants will read about, design, and practice activities they can do with their students. They will also communicate with their e-colleagues and the instructors to share ideas about the activities, science concepts, various teaching strategies, and their own teaching experiences related to the course topics. In addition, the science concepts covered include physical properties, physical change, chemical change, states of matter, density, and mixtures and solutions.					
12. Do	es this topic have prerequisites? No				
13. Do	es this topic have co-requisites? No				
14. D P	oes the topic require consent for enrollment?Yes X_No acultyCredential AnalystDeanProgram/Center/	Department - Director/Chair			
15. l:	s topic crosslisted: Ycs X No If yes, indicate which c	ourseand c	obtain signature in #18.		
16. V	What resources are needed to offer this topic (including technology)?				
17. J	ustification for offering this topic.				
Offering this course online gives practicing teachers a flexible option for continuing their education. As graduate credit, it will qualify as electives in their Master's degree. Online courses and options to the traditional coursework for Master's Degrees have found to be in high demand as reflected in a recent survey by the College of Education.					
* Kentur u	wite only if this is a variable units tonic course				

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18. Does this topic impact any other disciple	ines? Note: This number can be skipped	if answer to part 9 is "y	res."
Yes X No If yes, obtain sign	ature(s). Any objections should be stated	in writing and attached	to this form.
The delta delta della	Data	Support	Oppose
Discipline Signature	Lon	Support	Oppose
Discipline Signature	Date		
19. Location (if topic not offered at main ca	ampus) Online		
20. Is this course being offered on-line?	<u>X_</u> YesNo		
21. Is this a contract topic? X Yes	No		
22. Enrollment Limit: 30			
23. Requested Bldg/Room <u>N/A</u> Please call Extended Studies first to reserve	e the room.		
Plcase note: A separate Form E-T must be s	ubmitted for each section offered.		
ki/A - prosesagna	SIGNATURES		
1. Program/Center/Department - Director/Chai	Date		
2. College Dean (or Designee)	Date		
The academic credentials of the instructor listed above a curriculum vitae on file in the Program/Center/Departme T or Form E-T in the case of a topic that has already bee	re known to the Program/Center/Department (either ent Office). The instructor is qualified to deliver the m offered).	regular faculty, or adjunct fa topic as described in part 9 ()	culty with a or on a previous Form
3. Dean of Extended Studies (or Designee)		07	
Completed form received in the Office of Extended Studie	\$\$ 		
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Att 2000	ademic Programs Date	107	
4. Assomile vie President for Academic Attails - Ac	anderne i infrarro man		

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Work Experience:

1989-present

American Chemical Society

Develop and publish inquiry-based physical science activities for grades K-8 in print and on the web. Conduct teacher professional development workshops for teachers in grades 3-8 both in-person and online.

1988-1989

High school science teacher, Largo High School, Prince George's County Maryland. Taught 9th grade Biology. Developed lessons and labs for freshman biology with an emphasis on life processes at the molecular level.

1986-1988

High school science teacher, Escola Graduada de Sao Paulo, Sao Paulo, Brazil. Taught 9th grade Biology, 11th grade Physical Science, and co-taught Theory of Knowledge in the International Baccalaureate program.

1982-1986

Association of Trial Lawyers of America (ATLA), Washington, DC Associate editor for the ATLA Law Reporter Wrote articles reviewing case law and appellate decisions in the developing area of products liability law.

Education:

1983-1985 University of Maryland, College of Education, College Park, MD BS Science Education, 1985

1979-1982 Boston University School of Law, Boston MA JD, 1982

1974-1978 Columbia University, New York, NY BA Philosophy, 1978 COURSES > DEMO-CHEMISTRY THROUGHINGURY > COURSE INFORMATION > SYLLABUS



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Overview

Chemistry Through Inquiry

Course description

The course focuses on the National Science Education content standards for physical science and "science as inquiry" for K-4 and 5-8. As teachers do hands-on science investigations, read science background, and participate in discussion they will enhance their own science content knowledge and develop an inquiry-based approach to science teaching.

Performance objectives

In this course, students will:

- Develop an understanding of the National Science Education Standards for scientific inquiry and physical science for elementary and middle school students.
- Identity and explore developmentally appropriate activities that meet the NSES goals for chemistry-related physical science.
- Understand the elements of design of inquiry-based physical science activities and demonstrate proficiency as they analyze and conduct guided inquiry activities.
- 4. Develop strategies to:
 - o Motivate students to ask scientific questions they can investigate.
 - Guide students to identify and control variables to design valid scientific investigations.
 - Integrate abilities and understandings of scientific inquiry with physical science content.
- 5. Improve own understanding of fundamental chemistry concepts related to the science activities and identify appropriate level of understanding for students.
 - Physical properties and physical change.
 - States of matter,
 - o Density,
 - o Mixtures and solutions, and
 - o Chemical change
- 6. Develop a method for using science investigations as either formative or summative assessments.

Course Outline

Week 1: What is inquiry?

This week we read about inquiry from the National Science Education Standards and learn how an activity can be used to generate student questions and investigations.

Major Idea: Inquiry content and physical science content should be integrated when teaching science.

Week One topics include:

- What is inquiry? NSES for inquiry.
- Choosing Science Content, NSES for physical science.
- Is Seeing Believing? Substances have characteristic properties.
- Student Questions, Using student-generated questions to lead scientific investigations.
- · Putting Ideas (and M&Ms) Together. Identifying and controlling variables to create a fair test.
- Speaking the Language. Solutes, solvents, and the process of dissolving.

- L terature Connection. Historical example of famous controlled experiment.
- Get Your Feet Wet with Chemistry Content, Characteristics of water at the molecular level,

Week 2: Physical Properties and Physical Change

This week we investigate physical properties and physical change to discover the identity of an unknown solid and an unknown liquid.

Major Idea: Helping students to identify and control variables to design a fair test. A performance assessment can be an effective way of assessing this and other abilities and understandings of scientific inquiry.

Week Two Topics Include:

- Chemistry Myslery Solvers. The characteristic properties of substances can be used to identify unknown substances.
- Seeing is Perceiving. Developing tests to identify and compare characteristic properties of solids.
- Dissolving is the Solution! Solubility is a characteristic property a substance.
- . There and Back Again. In a physical change the identity of the substance itself is not changed.
- Flowing Right Along, Developing tests to identify and compare characteristic properties of four household liquids.
- Combining Liquids. The household liquids combine with water in characteristic ways.
- Assessing Progress, Inquiry activities as performance assessments.
- Mixin' It Up with Solutions. Physical properties, physical change, and solubility.

Week 3: States of Matter

This week we investigate the different states of water and explore how changes in temperature can affect them.

Major Idea: Developing strategies to help students design tests to investigate the effect of changes of state. Changes in state are a result of transfer of energy.

Week Three Topics Include:

- Expanding Possibilities. Gases expand when they are warmed.
- A Gas Bubble-o-meter, Gases contract when they are cooled.
- Evaporation and Condensation. Adding heat increases the rate of evaporation.
- Concentrate on Condensation. Removing heat increases the rate of condensation.
- A Moisture Mystery. Water vapor in the air condenses when it is cooled.
- Catch Your Breath. Real-life applications of condensed water vapor,
- Frosty the Snowcan, Water vapor condenses to a liquid and then freezes to ice.
- State Your Case. Heat transfer and changes of state.

Week 4: Density

This week we explore the concept of density through the context of sink and float.

Major (dea: Developing a meaning of density by comparing the weight of equal volumes of different substances. Changes in mass and volume affect density.

Week Four Topics Include:

- Floating the Concept of Density, Weight and volume determine density.
- Predicting Floaters and Sinkers. Comparing the weight of equal volumes of substances.
- Liquid Layers. Liquids have different densities and may sink or float in water.
- · Temperature Tower, Hol water is less dense than cold water.

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- Changing a Liquid's Density. An object may sink in fresh water yet float in saltwater because saltwater is more dense.
- Whatever Floats Your Boat. Increasing the volume of an object will decrease its density.
- Density is Uncanny. Life preservers work by adding volume without much mass.
- Content Background. Density is a combination of the mass of the particles and how tightly they are packed.

Week 5: Combining Substances

This week we discover that solids, liquids, and gases car all form solutions. We also use the evidence of chemical change to identify an unknown.

Major Ideas: Developing an understanding of the definition of solution and creating a chemical testing strategy to identify an unknown substance.

Week Five Topics Include:

- Just the Right Mix. Solids and liquids may or may not dissolve in water.
- Deconstructing the M&M. Substances break down to different extents in different solvents.
- Gases Dissolve, Tool Dissolved carbon dioxide gas can be removed from carbonated water.
- The Lemon Soda Challenge. Use understanding of dissolved gases to solve the problem of maintaining carbonation in a lemon soda.
- Colorful Cabbage. Substances react chemically in characteristic ways.
- Mystery Powder Line-Up. Characteristic results of chemical tests are used to identify an unknown.
- More Evidence of Chemical Change. Temperature change and formation of a precipitate can also be evidence of chemical change.
- Reviewing Mixtures, Solutions, and Chemical Changes. A chemical reaction involves the breaking and making of bonds.

Culminating Project

Students describe an investigation they have conducted or observed that develops a physical science principle. They then explain how the lesson incorporates or could be modified to incorporate the 5 essential features of inquiry.

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