



**Part II: Description of Curriculum Change**  
**1. SYLLABUS OF RECORD**

**I. Catalog Description**

**SCI 102 Fundamentals of Chemistry**

**2c-2l-2.5cr**

**Prerequisite:** Early Childhood/Special Education major or instructor permission

This chemistry course for pre-service early childhood/special education majors is a survey of chemical principles and concepts. A variety of chemical concepts will be presented, as well as their applications to technology and society. A series of laboratory exercises and projects will allow student to develop inquiry-based activities for the

**Objective 4**

Explain the way that science, and specifically chemistry, is done.

**Expected Student Learning Outcomes 1, 2 and 3**

Informed, Empowered and Responsible Learners

**Rationale:**

Students will gain an understanding of the habits of mind that underlie the scientific process: observing, classifying, inferring, predicting, measuring,

~~communicating, formulating hypotheses, comparing data, and identifying~~

	Law of Multiple Proportions, Dalton's Atomic Theory of Matter, Periodic Law, Modern Periodic Table	
5.	Exam #1	1 lecture
6.	<u>Models for the Atom: Atomic Structure</u> Plum Pudding Model, Nuclear Atom, Bohr Atom, Modern Atom and Quantum Theory	2 lectures
7.	Chemical Bonding	4 lectures

6.	Identification of a chemical unknown using chemical and physical tests.
7.	Ionic compounds: Bonding, chemical formulas and nomenclature
8.	Coordination Compounds: Bonding, Chemical Formulas and Nomenclature

nomenclature



## 2. SUMMARY OF PROPOSED REVISIONS

1. Pre-requisite courses changed to better meet the needs of ECSP students in their new curriculum and to allow more flexibility in taking their science courses.
2. Updated the course description to better reflect the nature of this class.
3. Objectives – course objectives were modified from the most recent syllabus of record and aligned with the Expected Undergraduate Student Learning Outcomes (EUSLO).
4. Common Learning Objectives for a Laboratory Natural Science course were incorporated

**II. COURSE OBJECTIVES**

This course is aligned with state and national standards (Pennsylvania Chapter 4 Academic Standards for Science and Technology, Pennsylvania Chapter 354 Standards for Chemistry Teacher Preparation, NSTA Standards for Science Teacher Preparation) and is designed so that the student will:



society and technology. [Ch. 4: 3.4.12.A. Ch. 354: IB. NSTA: 1a, 4c]

- Develop skills in the process of science: observing, classifying, inferring,

5.	<u>Models for the Atom: Atomic Structure</u> Plum Pudding Model, Nuclear Atom, Bohr Atom, Modern Atom and Quantum Theory	2 lectures
6	<u>Chemical Bonding</u> Ionic bonding, covalent bonding, polyatomic ions, writing chemical formulas, nomenclature of ionic and covalent compounds, chemical equations, shapes of molecules, polarity of molecules.	6 lectures
7.	<u>Solutions</u> Solvents, solutes, and solutions; intermolecular forces of attraction; the dissolving process; water and water as a solvent; predicting solubility; percent concentration, mole, molarity.	4 lectures
8.	<u>Acids, Bases, and Chemical Equilibrium</u> Definitions of acids and bases, ionization, dissociation, neutralization, chemical equilibrium and Le Chatelier's Principle, strength of acids and bases in relation to environmental problems and consumer products, pH.	2 lectures
9.	<u>Nuclear Chemistry</u> Atomic nuclei and nuclear symbols, nuclear emissions, nuclear reactions, half life, biological effects of radiation, sources of radiation exposure, nuclear medicine, nuclear fission versus nuclear fusion reactions, major differences between nuclear and chemical reactions.	2 lectures

**B. Laboratory Topics – 1 Laboratory Period for each Activity**

1.	Laboratory safety, indirect observation
2.	Measuring in the metric system

	nomenclature
8.	Covalent compounds: Bonding, chemical formulas and nomenclature
9.	Solubility Problem: Design and conduct an experiment to solve a problem
10.	pH calculations and the strength of acids and bases

The laboratory portion of this course is designed to provide the students with

*Dragonfly*

**Internet:**

<http://chemistry.org/portal/Chemistry?PID=wondernetdisplay.html&DOC=wondernet%5Cbestof%5Cbestof.html> (American Chemical Society's WonderScience)

**Standards:**

National Research Council. *National Science Education Standards*. National

Assignment Instructions for a major course assignment

## Chemistry Research project

During the next three weeks you will be performing, and reporting on an original experiment, related to one of the 6 topics provided below. You will be provided with equipment that will

5. Reporting the results.

**Group Poster presentation.** After you have completed the experiment, you must report your results to the class. To do this, your group will prepare a poster. The easiest way to construct a poster is to prepare a number of 8 ½ x 11 powerpoint slides, and attach them to a cardboard

Check the experimental design with your instructor, you must have your instructor's signature to begin the experiment.	Instructor's signature.
List the materials needed for your experiment	1. 2. 3. 4. 5.

## Topics

**Baking soda and vinegar.** – This is a classic chemical reaction performed as a demonstration for elementary students. As a project, students can look at several aspects of this reaction in detail. For example, what is the relationship between the amounts of materials, and the amount of CO<sub>2</sub> produced? What causes the reaction to proceed faster or slower? What temperature change occurs during the reaction? What factors effect this ( amount of material, how fast the reaction occurs)

**Properties of water.** –There are several important properties of water, surface tension, specific heat, heat of vaporization, ability to dissolve material. As a project, students might evaluate ways of measuring surface tension of various substances, determine the specific heat, or show how much energy it takes for water to evaporate to list a few examples. This project has many possibilities.

**The Burning Candle.** There is a lot of interesting chemistry in a candle. Students might



PRESENTATION EVALUATION FORM

Title: \_\_\_\_\_

Score: \_\_\_\_\_ /100

Start time: \_\_\_\_\_

End time: \_\_\_\_\_

Elapsed time: \_\_\_\_\_

Criteria	Points earned
1 The group clearly states their topic including a general	

original hypothesis.	/5
<b>TOTAL POINTS</b>	

**INDIVIDUAL REPORT EVALUATION FORM**  
 SCI 102      Fall 2013      Dr. Chinn

Name: \_\_\_\_\_

Score: \_\_\_\_\_ /50

Activity/Experiment: \_\_\_\_\_

Criteria	Points earned
1. A general discussion of the background of the topic is included. (e.g. What is water? What happens between water molecules?)	

**Answers to Liberal Studies Questions**

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