

Course Proposals for Chemistry Education Program Revisions

LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		02-656	App 4/15/03	App 4/29/03

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person Roberta M. Eddy	Email Address rmeddy@iup.edu
Proposing Department/Unit Chemistry	Phone 724-357-4482

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply)

New Course Course Prefix Change Course Deletion

Course Revision Course Number and/or Title Change Catalog Description Change

CHEM 499 Problems in Chemistry Education

Current Course prefix, number and full title

Proposed course prefix, number and full title, if changing

2. Additional Course Designations: check if appropriate

This course is also proposed as a Liberal Studies Course. Other: (e.g., Women's Studies, Pan-African)

This course is also proposed as an Honors College Course.

3. Program Proposals

New Degree Program Program Title Change Other

New Minor Program New Track

Catalog Description Change Program Revision

Current program name

Proposed program name, if changing

4. Approvals		Date
Department Curriculum Committee Chair(s)	<i>Ruhl See</i>	1/17/03
Department Chair(s)	<i>Rueyjan Fossen Ramsey</i>	1/17/03
College Curriculum Committee Chair	<i>[Signature]</i>	02/11/03
College Dean	<i>John J. [Signature]</i>	02/11/03
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)	<i>Joseph Demaradi TECC</i>	2-13-03
UWUCC Co-Chairs	<i>Gail S. Schust</i>	4/15/03

* where applicable

SYLLABUS OF RECORD

I. Catalog Description

CHEM 499 Problems in Chemistry EducationVar. – 1sh

Prerequisite: Chemistry Education major; Permission of chairperson

A course of independent study on selected problems in chemistry education, including library reading, lab work, and conferences with a chemistry education faculty member who is supervising the study.

II. Course Objectives

Upon the successful completion of this course, the student will be able to:

1. Select a problem in chemistry education to investigate.
2. Conduct a literature search for articles, including Material Safety Data Sheets, that involve the selected problem in chemistry education.
3. Conduct laboratory work that is related to the selected problem in chemistry education.
4. Apply all safety rules in the chemistry laboratory.
5. Maintain a laboratory notebook.
6. Analyze the data obtained for the selected problem in chemistry education.
7. Discuss the selected problem in chemistry education.
8. Demonstrate an understanding of the selected problem in chemistry education.
9. Write a formal report in scientific style that summarizes the investigation of the selected problem in chemistry education.
10. Write a lesson plan that appropriately involves the selected problem in chemistry education.

III. Course Outline

This course is an independent study so there is no detailed course outline. In general, this course contains the following components:

- A. Initial meeting with the chemistry education faculty member who is supervising the independent study. (2 hours)

Topics may include:

- a. Expectations of the student.
- b. Literature search instructions.
- c. Laboratory safety rules.
- d. Laboratory notebook instructions.
- e. Conference meeting schedule.
- f. Formal report instructions.
- g. Lesson plan instructions.

- B. The independent study. (45 hours)

Study includes:

- a. Literature search and readings.
- b. Laboratory work.
- c. Laboratory notebook.
- d. Writing the formal report.
- e. Writing the lesson plan.

- C. Conferences with the chemistry education faculty member who is supervising the study. (0.5 hour/week x 14 weeks = 7 hours)

Topics may include:

- a. Laboratory notebook review.
- b. Discussion of the problem under investigation.

- D. Submission of formal report, laboratory notebook, and lesson plan during final exam week. (1 hour)

Topics may include:

- a. Laboratory notebook review and discussion.
- b. Formal report review and discussion.
- c. Lesson plan review and discussion.
- d. Results and conclusions.

IV. Evaluation Methods

The final grade will be determined as follows:

Percent of Grade	Evaluation Method	Description
5%	Literature Search	At least 5 articles from refereed journals such as the <i>Journal of Chemical Education</i> or <i>The Science Teacher</i> and the Material Safety Data Sheets of all chemicals used in the study.
30%	Laboratory Notebook	A detailed, well-organized record of all laboratory work that meets the criteria specified by the supervisor of the study during the initial meeting. Includes all hazards and safety precautions.
5%	Conference Discussions	A test of the student's knowledge of the fundamental chemical principles involved with the problem and ability to discuss the problem.
30%	Formal Report	A summary of the investigation written in scientific style that meets the criteria established during the initial meeting. (Note: the criteria and format of the report are dependent on the type of chemical education research that is conducted.)
30%	Lesson Plan	A complete, detailed lesson plan that appropriately incorporates the research problem for the intended students.

V. Grading Scale:

A: $\geq 90\%$ B: 80-89% C: 70-79% D: 60-69% F: $< 60\%$

VI. Attendance Policy

There is no formal attendance policy for this course. The student manages his or her own time with the expectation that he or she will spend an amount of time comparable to four hours per week for 14 weeks.

VII. Required Textbook(s), Supplemental Books and Readings

There is no required textbook for this course.

Journals containing articles on chemistry education are:

- *American Heritage of Invention & Technology*
- *American Journal of Physics*
- *American Scientist*
- *Bulletin for the History of Chemistry*
- *Chem13 News*
- *Chemical Engineering Education*
- *Chemical Heritage*
- *Chemistry & Industry*
- *The Chemistry Place*
- *Chemunity News*
- *Computing in Science and Engineering*
- *Educacion Quimica*
- *Education in Chemistry*
- *Educause Review*
- *Foundations of Chemistry*
- *Hyle, An International Journal for the Philosophy of Chemistry*
- *International Journal of Science Education*
- *Journal of Chemical Education*
- *Journal of Chemical Education: Software*
- *Journal of College Science Teaching*
- *Journal of Research in Science Teaching*
- *Journal of Science Education and Technology*
- *Level Line*
- *Nature*
- *Physics Education*
- *The Physics Teacher*
- *Science*
- *Science News*
- *The Science Teacher*
- *Scientific American*
- *The Scientist The Newspaper for the Life Sciences Professional*
- *Teachers Clearinghouse for Science and Society Education Newsletter*
- *The Textbook Letter*
- *University Chemistry Education*
- *WonderScience*

VIII. Special Resource Requirements

The students are required to purchase goggles and a laboratory notebook.

Depending on the study, the student may have to purchase household chemicals and materials at the grocery store, hardware store, and/or drugstore.

There is no lab fee associated with this course.

IX. Bibliography

Dodd, J.S., Ed. *The ACS Style Guide*; American Chemical Society: Washington, DC, 1997.

Kanare, H.M. *Writing the Laboratory Notebook*; American Chemical Society: Washington, DC, 1985.

National Research Council. *National Science Education Standards*. National Academy Press: Washington, DC, 1996.

National Science Teachers Association. *Standards for Science Teacher Preparation*, 1998. [On-line]. Available:
<http://www.nsta.org/main/pdfs/nsta98standards.pdf>

Pennsylvania Department of Education. *Academic Standards For Science and Technology*, 2002. [On-line]. Available:
<http://www.pde.state.pa.us/k12/lib/k12/scitech.doc>

Pennsylvania Department of Education. *Chapter 354, Pennsylvania Bulletin*, 30, 2002, 30-41. [On-line]. Available:
<http://www.pabulletin.com/secure/data/vol30/30-41/1719.html>

Course Analysis Questionnaire

Section A: Details of the Course

- A1. CHEM 499 Problems in Chemistry Education is the counterpart to CHEM 498 Problems in Chemistry.

CHEM 499 is designed specifically for the chemistry education majors.

Prior to our program revisions, all chemistry and chemistry education majors took CHEM 498 Problems in Chemistry. Now CHEM 498 has been revised so that it better meets the needs of the chemistry majors, but no longer meets the needs of the chemistry education majors. For example, the focus of CHEM 498 is to prepare the students to do scientific research, writing, and presentations in chemistry. Thus, CHEM 498 is preparing students to be chemists. CHEM 499 is preparing chemistry education majors to be chemistry teachers.

- A2. This course does not require changes in the content of existing courses or requirements for the program.
- A3. This course was the former CHEM 498 which is now revised specifically for the chemistry majors.
- A4. This course is not to be a dual-level course.
- A5. This course may not be taken for variable credit.
- A6. Four other universities in the SSHE system offer this type of course. These universities and courses are shown in the table below.

University	Course
Bloomsburg	65.581 Independent Study in Education
California	CHE 368 Individual Work
Kutztown	SEU 380 Independent Study in Education
Lock Haven	CHEM 390 Problems in Chemistry (an elective)

- A7. The content and skills associated with this course are required by our Learned Society, the National Science Teachers Association (NSTA) according to Standard 1 Content, Dimension 1.c. which states:

Design, conduct and report investigations within a science discipline.

The Chemistry Education majors have to provide evidence that they have met this standard. NSTA lists possible sources of evidence as: projects and theses, lab assignments, test results, and synthesis of small projects.

Section B: Interdisciplinary Implications

- B1. This course will not be taught by instructors from more than one department or team taught within the department.
- B2. There is no relationship between the content of this course and the content of courses offered by other departments.
- B3. This course will not be cross-listed with other departments.
- B4. Seats in this course will not be available to students in the School of Continuing Education.

Section C: Implementation

- C1. Faculty resources are adequate. Faculty workloads for the chemistry education faculty will be the same as before when the course was CHEM 498.
- C2. Other resources and their adequacy are described in the table below.

Resource	Adequacy
Space	Laboratory and desk space are available in the Chemistry Department. Computers are available in the Chemistry Department's computer lab.
Equipment	All necessary equipment is available through the Chemistry Department.
Laboratory Supplies and Other Consumable Goods	Most laboratory supplies and consumable goods are available through the Chemistry Department. Depending on the study, students may have to purchase some household chemicals at the grocery store.
Library Materials	Library materials are adequate and may be obtained through IUP's libraries, the Chemistry Department library, and faculty collections.
Travel Funds	No travel funds are necessary.

- C3. No resources for this course are grant funded.
- C4. This course will be offered every semester. This course is not designed or restricted to certain seasonal semesters.
- C5. One section of this course will be offered in any single semester.

Course Proposals for Chemistry Education Program Revisions

- C6. We plan to accommodate one or two students in a section of this course. There are very few senior chemistry education majors.
- C7. No professional society recommends enrollment limits or parameters for a course of this nature.
- C8. This course is not a distance education course.