

ED 414 – TEACHING ELEMENTARY SCHOOL SCIENCE AND HEALTH

Syllabus and Course Information Sheet – Spring 2009

Department of Teacher Education
Colorado State University – Pueblo

Professor: Dr. Jeff Piquette

Office: T 269

Office Hours: T 3:30-4:00, W 10-noon, Th 11-1 &
3:30-4:00, F 10-11, or by appt.

Prerequisites: Admission to TEP

Meeting Times: W 8:00 – 9:50 a.m.

Phone: 719-549-2825

Email: jeff.piquette@colostate-pueblo.edu

Course Website: blackboard.colostate-pueblo.edu

Credit Hours: 2

Co-requisite: 30 Field Experience Hours

Classroom: T 232

Catalog Description

Methods of teaching health and science in the elementary school. Part of elementary field experience block.

Philosophy

This course provides prospective elementary teachers with the basics of elementary school science and health curriculum and methods. Students will gain expertise in standards-based science education, including planning, instruction, and assessment based upon the Colorado and national science standards. A constructivist philosophy will direct the instruction of this course. Utilizing materials, resources, and technology that support elementary science education, they will learn to integrate inquiry-based, project- and problem-based, and collaborative strategies into long-term and daily science activities. Each student will work individually with science educators to plan and implement classroom and laboratory activities with elementary students, reflecting and utilizing a range of strategies to evaluate their own teaching. Throughout the course, students will develop the expertise to foster scientific thinking and plan instruction to meet the needs of elementary students with diverse learning styles. Another mission of the course is to assure that all students have a range of activities, plans, and resources available when they begin to teach science to elementary students.

Required Texts

Martin, D. (2009). Elementary Science Methods 5th ed. CA: Thomson-Wadsworth.

Colorado Department of Education. (1995). Colorado model content standards for science. Available free online!

National Research Council. (1996). National science education standards. Washington, D.C.: National Academy Press. Available free online!

National Science Teachers Association. (1996). NSTA elementary pathways to the science standards: Guidelines for moving the vision into practice. Washington, DC. #PK130X1 Available free online!

Course Objectives

Upon completion of all course activities each student will meet the following benchmarks for teacher education. *Please note that our program standards are being re-aligned and the numbers may change!*

1. To construct knowledge of science and health

- examine current forces and trends **(6.1, 6.4)**
- analyze the underlying theoretical and philosophical positions and their implications in regard to equitable teacher decisions **(6.2, 6.3, 6.4)**
- examine the current research and its implications **(6.4)**
- demonstrate an understanding of elementary science and health content
- examine issues of diversity and equity and the implications for science and health teaching **(3.2, 3.7, 6.2, 6.4)**
- demonstrate a synthesis of constructed knowledge
- demonstrate processes of a scientist, such as hypothesizing, inferring, observing, communicating, predicting, investigating, classifying, identifying, problem solving, measuring, and recording data
- examine personal science and health content area literacy dispositions (6.3, 6.4)
- demonstrate an awareness of instructional strategies that address equity issues (3.2, 3.3, 3.6, 3.8, 3.9, 5.2, 6.4)

- develop a personal science and health education philosophy based in sound research (6.2, 6.3, 6.4)
- 2. To construct pedagogical (theoretical ideas about how to teach) thoughtfulness**
- construct science and health pedagogy based on the best professional knowledge (3.1, 3.3, 3.6, 3.8, 3.9, 6.4)
 - demonstrate professional autonomous science and health decision making
 - engage in reflective practices which demonstrate professional knowledge (6.6, 6.8)
- 3. To construct curricular connections**
- examine science and health curriculum and instruction and its connections to other subject areas (2.1, 3.2, 5.3)
 - demonstrate science and health content connections and cross curricular connections (2.10a, 3.2, 5.3)
 - demonstrate an understanding of equity issues and their connections to teaching practices (2.10b, 3.3, 3.4, 3.6, 3.8, 3.9, 5.8)
 - integrate technology as an instructional aid and as a valuable text resource for students (6.5)
- 4. To construct a science and health education knowledge base**
- apply instructional techniques of content area literacy in science and health instruction (2.1a, 2.2, 2.3, 2.4g-h)
 - demonstrate an ability to construct lessons in science and health which include strategies that support the NSTA Standards (2.6, 2.7, 2.8, 2.9, 2.10a-f)
 - demonstrate awareness of strengths and weaknesses of several formal and informal assessments used to measure science concepts and processes and incorporates multiple methods to ensure validity and reliability (4.1, 4.2)
 - determine factors which influence science processes including text factors, language, perceptions, stages of development, traditions, multiculturalism, ways of knowing (2.6, 2.7, 2.8, 2.9, 2.10a-f)
 - integrate science processes throughout every science and health lesson
 - recognize and apply the Colorado state science standards (2.2, 2.7, 2.9, 4.1)
- 5. To construct schema for planning and organizing science and health instruction**
- demonstrate use of the processes of science: observing, hypothesizing, communicating, measuring, predicting, classifying, relating space/time, using numbers, identifying and inferring (5.5, 2.8)
 - demonstrate awareness and use of children's and young adult's literature as a strategy for learning content knowledge (5.3)
 - demonstrate the use of knowledge in behavioral psychology, humanistic psychology and cognitive psychology in planning instruction that is developmentally appropriate (2.10a-b)
 - demonstrate use of a variety of assessment techniques, including ongoing assessment (4.1, 4.2, 4.3, 4.7)
 - plans lessons in which the assessment matches the standards and benchmarks (4.1)
- 6. To construct a learning community which enhances learning**
- utilize the personal learning communities established in class to support personal growth and development in science and health education (3.2, 3.4, 3.5, 3.6, 3.7)
 - apply the techniques of cooperative learning to establish learning communities for children and/or young adults (5.1c)
 - demonstrate the use of cooperative and academic tasks in cooperative group work (5.1c)
 - modify teaching based on the feedback of others (4.8)
 - apply a variety of scaffolds to support the growth and development of a variety of learner needs (3.13)
- 7. To utilize a variety of professional resources, including ones own research, to improve the quality of student learning (6.4, 6.5, 6.6, 6.7, 8.10)**
- locate information relevant to educational issues and research questions through database searches utilizing the internet (including ERIC) (5.11, 6.7)
 - locate effective lesson plans, activities, and web-based resources to teach science and health in the elementary classroom (5.11, 6.7)
 - access websites of national and state organizations, as well as their links, and use sites to gain information (6.7)
 - demonstrate use of technology resources in presentations, lesson planning, projects and research (4.9, 5.10, 6.5)

Requirements

1. **Quizzes:** 1 @ 40 points, total = 40 pts.
We will have one midterm quiz that will cover the readings and class topics. The exact date will be announced later.
2. **Science Lesson Plans:** 3 @ 30 points, total 90 pts.
You must turn in three lesson plans demonstrating quality science instruction. The lessons must encompass a variety of different styles such as inquiry, interactive lecture, laboratory experiments, problem/project-based learning, and collaborative lessons. All lesson plans must be for lessons that you actually teach as part of your field experience and should include the components agreed upon by the class.
3. **Science Resource eNotebook:** 25 pts.
Each week, for weeks 2-6 of the course, students are expected to post a resource to share with the rest of the class. It could be a book, Internet site, lesson plan, etc. The student is responsible for making sure that the resource is unique (not a duplicate of one already posted), put into the correct Blackboard Discussion Forum with enough heading information to know what it is, and a short description of what it contains. All resources should reference the authors and be applicable to this class. These resources will be available for everyone to download and compile. Occasionally, the resource may have to relate to the theme of the week.
4. **Bi-Weekly Reflections:** 7 @ 5pts and 1 (final) @ 15. Total 50 pts.
Each student is to keep a personal journal related to what they are thinking and feeling about the course. There is a minimum requirement of one entry every two weeks on the even numbered weeks (2, 4, etc.). The student should be reflecting on (a) all topics related to the course covered that week, (b) their field experiences for the week, and (c) their general attitude toward science education. These three components should appear in each entry! The journals must be electronic, but can be somewhat informal. In other words, you do not have to have perfect grammar, spelling, etc. However, the typical "chat" usage is not acceptable. You must at least make an effort. Finally, these journals are for your eyes, my eyes, and anyone else you want to share them with. They are meant to be a private reflection on your journey through this phase of learning about what it is to be a science teacher. I will not be evaluating what you say, but on how well you reflect on each of the three items listed above. Journal entries are due at class time for the previous 2-week period. At the end of the semester, you will read over your journals and reflect on how your image of science education has changed. This means you should keep a copy of them! (I'd recommend keeping them in one document.) I will give feedback on the reflections for the first few weeks, but after that, I will just provide your score unless you request more.
5. **Science Project(s):** ~100pts.
I'm not sure exactly what this/these might be yet, but you will have a few additional science teaching projects throughout the semester. I'll give you more details as I have them.
6. **Teaching Evaluations:** 3@10 pts. and 1@20pts. Total 50 pts.
The three lessons that you teach in your field experiences must be formally evaluated, using the evaluation form distributed in class. In all three cases, you must complete a self-evaluation and have the cooperating teacher who observed you evaluate them. I will be grading the self evaluations on how well you reflect on the various goal areas on the evaluation form. I will not grade the content of the cooperating teacher's evaluation, but just check to see that it was completed. If a cooperating teacher's evaluation suggests that action is needed, you may be placed on a support plan to help you improve on future lessons. One of the lessons must be evaluated by the course instructor (20 pts), so you should plan to record one for possible inclusion in your teaching portfolio and to aid with my evaluation of your teaching.
7. **Mini Science Lesson:** 20 pts.
All students must teach a mini science lesson to the rest of the class. This lesson should be based on sound pedagogy and should be done in consultation with the course instructor. You will do this as a small group of students and are required to post the necessary information about the mini lesson to Blackboard so that everyone can get it. This will be done through a Discussion Board Forum. You will sign up for a particular week early in the course. More information on this requirement will be provided later.
8. **Field Experience Activities:** teacher evaluations 20 pts.
At the end of the semester, you will be asked to turn in your log of field experience hours and activities. Your cooperating teacher will also complete an evaluation of your work in his/her classroom. Both logs and evaluations must be submitted before a passing grade can be given for the class. Logs will be evaluated based on the quality and quantity of activities performed and evaluations will be based on the quality of your performance in the classroom as shown by your cooperating teacher. You are to complete a minimum of 30 hours in the field experience. Be prepared to participate as an educator in the classroom each time you attend. Your instructor may ask you to prepare materials, activities, etc., for each class. Required activities include preparing and teaching lessons with the assistance of your teacher and conducting classroom action research.

Grading

At the end of the course, all points will be summed, and grades assigned according to the following:

| Percentage Range | Grade Level | GPA |
|------------------|-------------|-----|
| 100% to 94% | A | 4.0 |
| 93% to 90% | A- | 3.7 |
| 89% to 87% | B+ | 3.3 |
| 86% to 84% | B | 3.0 |
| 83% to 80% | B- | 2.7 |
| 79% to 77% | C+ | 2.3 |
| 76% to 70% | C | 2.0 |
| 69% to 67% | D+ | 1.3 |
| 66% to 64% | D | 1.0 |
| 63% to 60% | D- | 0.7 |
| 59% and below | F | 0.0 |

For a minimum grade of “C” in the course, all of the requirements included above must be completed and turned in for a grade.

Tentative Course Schedule – Check Blackboard Weekly for Updated Schedule

| Week/Date | Chapter: Topic |
|-------------------|---|
| 1. Jan 14 | Course Introduction, Field Experience, & the Nature of Science Jan 16 – End of Add Period |
| 2. Jan 21 | Ch. 1: The Science Education Imperative |
| 3. Jan 28 | Ch. 3: The Processes of Science (through pg. 141) Jan 26 – End of Drop Period |
| 4. Feb 4 | Ch. 3: The Processes of Science (pg. 141 to end) |
| 5. Feb 11 | Ch. 8: Assessment |
| 6. Feb 18 | Ch. 8: Assessment (cont.) |
| 7. Feb 25 | Station-to-Station Teaching |
| 8. Mar 4 | Ch. 4: Constructivism in Elementary Science Education |
| 9. Mar 11 | Ch. 5: Inquiry Mar 13 – Last day to drop with a W |
| 10. Mar 18 | Station-to-Station Teaching trial run |
| Mar 24-28 | Spring Break |
| 11. Apr 1 | Station-to-Station Teaching for PSAS |
| 12. Apr 8 | Ch. 10: Reading, Writing, & Interdisciplinary Approaches |
| 13. Apr 15 | Ch. 11: Technology in Elementary Science Education |
| 14. Apr 22 | Special Topics, Catch up, and Review |
| 15. Apr 29 | Final Exam Session, 8:00—10:20am |

Course Policies

1. **Schedule and Blackboard:** The schedule above is very tentative. It is likely that we will have to change it as we learn more about our semester projects. Updates to this schedule will be posted to the course Blackboard site. It will be used extensively and is your primary source of information about what will be happening each week of class. I will update the site no later than 5:00pm every Friday for the following week. Please check it accordingly so that you know what is expected of you.
2. **Attendance and Participation:** Please attend all classes on time. Much of the class time will be spent in collaborative activities, and your absence will affect your own learning and that of the members of your group. Therefore, each unexcused absence will result in a loss of 2 points, and students entering class late will lose 1 point. An *excused absence* is one in which an unforeseen and unpredicted emergency results in absence or lateness. Attendance is a professional

responsibility, and excused absences will be treated much as they would be for educators in public schools. Illness (with verification), deaths in the family, transportation problems (a car accident or car breakdown on the way to class) may be examples. Because the professor does not like to be placed in the position of judging the veracity of an excuse, independent, objective evidence should be submitted. To be an excused absence/tardy, the student must call and leave a message about the absence on the professor's voice mail as soon as possible (before class) so that the impact of the absence on class activities can be minimized. Cell phones are not to be used during class time. A grade penalty will be instituted if this policy is abused.

Excessive absences, whether excused or unexcused, will result in a meeting with the professor and, if the professor believes that sufficient content has been missed so that the student cannot master course objectives, the student will be asked to drop the course. It is always the responsibility of the student to gain information about content, assignments, etc. that she/he missed.

Lateness or unexcused absences in *Field Experiences* cannot be tolerated – the teacher and students in the school are counting on your attendance. One unexcused absence will result in the drop of one whole letter grade in the class. Two unexcused absences will result in removal from the field experience with no opportunity to be placed in another classroom. Removal will be reported to the Department of Teacher Education. Additionally, it is crucial that you set up your field experiences early in the semester. If you do not submit your signed field experience placement form by the deadline given in class, you will receive a fractional grade penalty (e.g. A- instead of an A) for each day it is late.

3. **Late Assignments:** An assignment is late if it is not turned in at the place, date, and time established by the professor. All assignments turned in late will result in a reduction of 10% of possible points for each day late. The professor understands that at times there are extraordinary circumstances that occur and should be taken into consideration. These circumstances must be shared with the professor before the due date (and not the night before) in order for any extension to be given.
4. **Incomplete Grades:** A grade of “Incomplete” will only be assigned if a student and the professor has agreed upon the grade before the end of the last week of classes and will not be assigned merely because work may be incomplete. Extraordinary circumstances such as excused illness or death in the family must have occurred for an incomplete to be considered. In all cases, if an incomplete is granted, it is the responsibility of the student to submit a timeline of due dates for all incomplete assignments. Failing to meet such timelines will result in grades of “0” on those assignments.
5. **Extra Credit:** Because the course grade is an evaluation of proficiency on the competencies described in the syllabus, extra credit will not be accepted in the course.
6. **Writing Requirements:** Please proof all work you submit. A percentage of the points for each activity are assigned for the quality of writing.
7. **Civility:** Learning is facilitated when all members of the community act in a respectful and civil manner to each other. The following types of behavior are not professional, and will result in feedback from the professor. If continued, they will result in a request to withdraw from the course, with this information sent to the Department of Teacher Education:
 - Name-calling, including the use of personal or racial epithets.
 - Negative, offensive comments about the work of peers, children, etc.
 - Explosive, angry, confrontational behavior that appears harassing, violent, or threatening. This may be either verbal or non-verbal.
 - Rude speech or non-verbal behavior which interferes with others learning, for example repeated speaking while others (peers or the instructor) have the floor to talk, making distracting or other non-verbal expressions that are unprofessional (e.g., making faces in response to peers' comments).
 - Inappropriate care of the environment, including destruction of the university's or others' property.
8. **Plagiarism:** Honesty is an essential characteristic of all educators. Please reference all ideas and information you receive from others, from printed materials, and from sources such as the Internet. Failing to do so will result in a grade of “0” for the assignment, with no opportunity to redo. Examples of plagiarism may include turning in an assignment (or part of an assignment) completed by someone else or copied from published or printed materials or the Internet or turning in the same assignment (e.g., a lesson plan) in more than one class.

9. **ADA Accommodations:** This University abides by the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, which stipulates that no student shall be denied the benefits of an education "solely by reason of a handicap." If you have a documented disability that may impact your work in this class and for which you may require accommodations, please see the Disability Resource Coordinator as soon as possible to arrange accommodations. In order to receive accommodations, you must be registered with and provide documentation of your disability to: the Disability Resource Office, which is located in the Psychology Building, Suite 232.

Other Information about the Course

Relationship to Conceptual Framework for Teacher Education

The elementary science methods course seeks to establish a strong in-class learning community founded on 1) common goals and shared expectations among all participants, 2) strong collaborative learning relationships among students both inside and outside the university classroom, and 3) the development of learning communities in elementary science classrooms. A major focus of course activity across the semester will be expanding students' learning communities from those of "traditional" student-student relationships to those formed when professional educators plan and work together. To accomplish this, extensive peer mentoring and peer review activities are planned, with students working together to plan and to evaluate their own and each others' work. Activities include peer evaluations of teaching and a group action research plan.

Another focus of the class will be expansion of the student's role into the larger teaching/learning community, moving from that of university student to that of beginning teacher. Throughout the semester, students will assume the roles of apprentice teachers in science classrooms, working with science educators. The nature of changing relationships with elementary students and with cooperating teachers and peers will be reflected upon during the semester. Through research and planned professional development activities, students will be required to assume an additional role as a professional educator in professional science and education organizations.

In this class the instructor will assume the role of instructor (directing some instruction), facilitator (of learning groups, providing feedback), and learner. In addition, the instructor will provide a model of the scientist/teacher, approaching issues of teaching and learning with the disposition of a scientist and researcher.

Curriculum Design

Aspects of curriculum design include the following:

1. Extensive use of **collaborative groups**, following the Johnson and Johnson model, with assignment of roles, interdependent goals, and individual checks of mastery.
2. **Apprenticeship** activities with elementary science educators, in which teachers mentor, provide input and feedback.
3. Extensive use of **self-analysis** and **peer review** of teaching, including in-class critique of video case studies teaching examples and analysis of teaching episodes of class members.
4. Attempts to make learning contextual by use of **case studies**, as well as field experience activities linked to theories and activities in the college classroom.
5. High expectations for skill and learning acquisition through evaluation of knowledge (quizzes) as well as the use of evaluation checklists and rubrics for all projects based on input science educators.
6. Use of a variety of strategies to integrate skills, knowledge, and activities, including the use of **nesting, sequenced curricula, threaded, and integrated strategies**. Areas of the teacher education curriculum, which have been integrated, include student skills at collaboration, lesson design, research/inquiry, technology, diversity, assessment, management, reflection, literacy, and content knowledge.

References for the Course/ References for Further Reading

American Association for the Advancement of Science. (1993). Benchmarks for science literacy. New York: Oxford University Press.

American Association for the Advancement of Science. (1993). Science for all Americans: A Project 2061 report on literacy goals in science, mathematics, and technology. New York: Oxford University Press.

Brown, A.L., and J.C. Campione, J.C. (1994). Guided discovery in a community of learners. In Classroom lessons: Integrating cognitive theory and classroom practice, K. McGilly, ed.: 229-270. Cambridge, MA: MIT Press.

- Bruer, J.T. (1993) . Schools for thought: A science of learning in the classroom. Cambridge, MA: MIT Press.
- Chiappetta, E.L., & Koballa, Jr., T.R. (2006). Science instruction in the middle and secondary schools, 6th ed. Upper Saddle River, NJ.: Prentice-Hall.
- Colorado Department of Education. (1995). Colorado model content standards for science.
- Darling-Hammond, L. (1992). Standards of practice for learner centered schools. New York: National Center for Restructuring Schools and Learning.
- Harlen, W. (1992). The teaching of science. London: David Fulton Publishers.
- Hazen, R., and James T. (1992). Science matters: Achieving scientific literacy. New York: Doubleday.
- Loucks-Horsley, S., Brooks, J.G., Carlson, M.O., Kuerbis, P., Marsh, D.P., Padilla, M., Pratt, H., and Smith, K.L. (1990). Developing and supporting teachers for science education in the middle years. Andover, MA: The National Center for Improving Science Education.
- National Committee for Science Education Standards and Assessment. (1994). National science education standards: Draft for review and comment. Washington, DC: National Research Council. November 1994.
- National Research Council. (1996). National science education standards. Washington, D.C.: National Academy Press.
- National Science Teachers Association. (1996). NSTA pathways to the science standards (high school): Guidelines for moving the vision into practice. Washington, DC. #PK130X3
- National Science Teachers Association. (1998). NSTA pathways to the science standards (middle level): Guidelines for moving the vision into practice. Washington, DC. #PK130X2
- National Science Teachers Association. (1992). NSTA standards teacher certification. Washington, DC: NSTA.
- National Science Teachers Association. (1983). NSTA standards for science teacher preparation. Washington, DC: NSTA.
- National Science Teachers Association. (1993). Scope, sequence, and coordination of secondary school science. Volume I: The content core. Washington, DC. 1993.
- Schoen, D. (1987). Educating the reflective practitioner: Toward a new design for teaching and learning in the professions. San Francisco: Jossey-Bass.
- Shulman, L.S. (1987). Knowledge and teaching foundations of the new reform. Harvard Education Review, 57 (1), 1-22.